DEC 19 1942

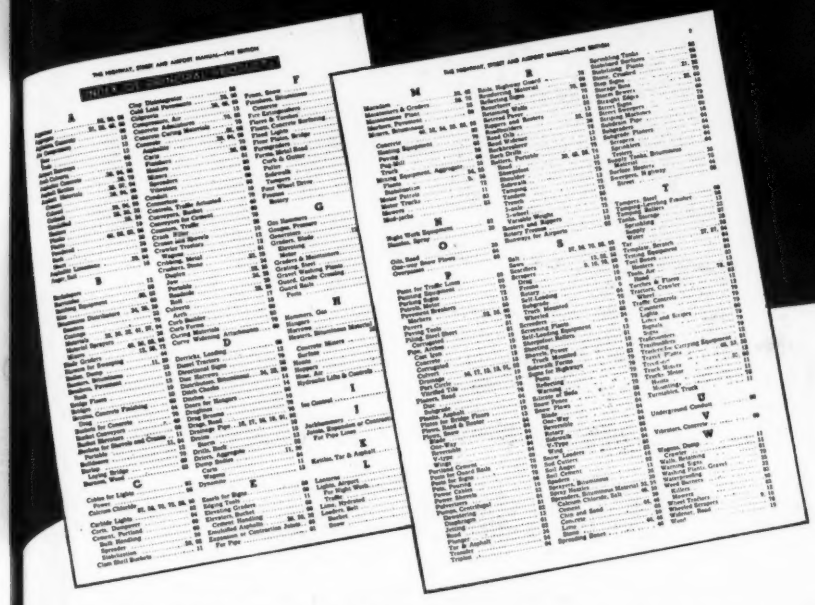
DECEMBER, 1942

# PUBLIC WORKS

## ENGINEERING

Products Described
Manual

## MAKES IT EASY FOR YOU TO SELECT EQUIPMENT AND MATERIALS BEST SUITED FOR ANY CONSTRUCTION OR MAINTENANCE JOB



## HE HIGHWAY, STREET AND AIRPORT MANUAL

***Complete, authoritative and easy to understand***

VERY type of equipment and material suitable for use in street, highway and airport maintance and construction is described in this valu- Manual. Yearly revisions make the Manual the up-to-date and authoritative source for infor- ion of this kind.

### 1942 Contents Include

1—Grading and Excavating
2—Drainage and Subdrainage
3—Aggregates and Their Production
4—Bituminous Materials and Their Use
5—Flexible Type Surfaces
6—Cement Concrete
7—Maintenance Methods and Equipment
8—Airports

### Engineers Like The Manual

"It is very helpful in our airport construction work."—P. D. B., *War Dept. Engr.*

"The Manual is more helpful in actual everyday work than any textbook or handbook."—E. L. P., *City Engr.*

"The write-ups covering particular pieces of equipment are often found to be very helpful in an understanding of specifications and an aid to the solution of some of our problems peculiar to our locality and climate."—L. O. F., *County Engr.*

"The Manual is a very useful collection of data on highway work."—V. L. G., *State Hwy. Engr.*

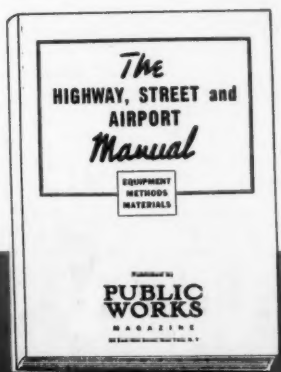
**The Highway, Street and Airport Manual not only describes and illustrates all available types of equipment and materials but tells you who makes them and what kind of work each type is best suited for. This is a great help in deciding whether or not a certain piece of equipment will do the work you have in mind.**

**In addition to the complete information about equipment and materials you will find in each chapter of the Manual a brief summary of the latest approved methods for best doing that kind of work.**

**There is no other publication like the Manual and every one concerned with Streets, Highways and Airports will find it a rich source of helpful information.**

### Send for Your Copy

**If you do not have a copy of this useful Manual already, send $1.00 for one today. Money back in full if you are not more than satisfied.**




## THE HIGHWAY, STREET AND AIRPORT *Manual*

310 EAST 45th ST., NEW YORK, N. Y.

# Performance like this shows why..

Pozzolith concrete used throughout this sewage treatment plant in Mansfield, Ohio. George B Sowers, Consulting Engineer, Cleveland; Lowensohn Construction Co., Contractors, Cleveland.

# POZZOLITH (Cement Dispersion)

## is Specified by Leading Engineers...

ENTHUSIASTIC approval of the performance of Pozzolith has resulted in many statements from leading engineers like the following:

June 5, 1942—"In the construction of the Mansfield, Ohio sewage treatment plant, built in 1936, Pozzolith produced a dense, waterproof concrete of high strength yet having sufficient plasticity for easy placing . . . Recently all of the concrete was cleaned and inspected and found to be in sound and perfect condition. There has been no disintegration, either from frost or sewage action, not even at the waterlines."

GEORGE B. SOWERS, Consulting Engineer.

Find out how Pozzolith produces greater speed, strength, workability, watertightness, durability and lower costs. Send for illustrated Pozzolith booklet and Research Papers No. 36—"Economics of Cement Dispersion" (for mass concrete) and No. 39—"Cement Dispersion and Air Entrainment" (for runways and pavement).

**THE MASTER BUILDERS COMPANY**

CLEVELAND, OHIO — TORONTO, ONTARIO

# MASTER BUILDERS

# THE WAR EMERGENCY

## Revised Gasoline Rationing Procedures

Beginning December 1, 1942, gasoline rationing procedures have been revised considerably from those previously in effect in the eastern seaboard area. The following information re the revised procedures was obtained from OPA and ODT. Gasoline will be made available for municipal trucks in quantities sufficient for the mileage approved on the "Certificates of War Necessity," issued by the Office of Defense Transportation. Under the provisions of General Order ODT 21, no truck may be operated in the continental United States after December 1, 1942, without such a certificate. Records of gasoline consumption and mileage summarized for three months periods starting January 1, 1941, will serve as the basis for approval of the mileage allowance by ODT. Local rationing boards will issue "Transportation Ration" coupon ("T" rations), in amounts covering the (gallonage and mileage) requirements certified by ODT.

A somewhat different procedure will govern in the case of municipally owned passenger cars. Form OPA R-551 will be used by governmental units in applying for gasoline for these cars. Local rationing boards will issue bulk certificates or coupon books, whichever fit the local purchasing method, for the quantity of gasoline approved.

Non-highway gasoline-powered equipment will be allowed special rations to fit specific needs according to information received from OPA at the time this memorandum was drafted. More specific information is not available at this time. Private automobiles used in the service of governmental units will be granted special rations upon request submitted on Form OPA R-535, after registration in the manner prescribed for all privately-owned automobiles.

## Wood to Replace Steel for California Highway Signs

For the duration, there will be no more steel signs directing and warning motorists along the highways and byways of California.

Cooperating with the government's request to conserve critical materials, the markers posted by the sign-posting department of the Division of Highways, through the wartime emergency, will be composed of pressed hardwood.

Reflectorized signs will be made of the same material, beaded to reflect headlights. The first beaded placards were posted recently along the Southern California coastline designating authorized dim-out zones, replacing the emergency heavy cardboard markers.

Pre-war signs were made of porcelain enamel fused into steel for indefinite lasting qualities. The substitute pressed wood signs, treated and painted for preservation, are expected to prove durable for a number of years.

Redwood posts will be utilized where metal posts were previously used. For the few instances where metal standards may be considered absolutely necessary, a small supply of such poles remain in stock. The only metal signs installed will be a few standard types still on hand.

## "Critical" Waterworks Positions

The Selective Service Headquarters lists the following as "critical" or "key" positions in the water supply field: Sanitary chemist, chief station engineer, civil engineer, designing engineer, electric engineer, hydraulic engineer, mechanical engineer, fireman—mechanically fired boiler, foreman—distribution system, sub-foreman—distribution system, foreman—meter shop, general officer or major department head, maintenance man—boiler and pumping equipment, maintenance man—transmission and distribution, pumping station operator, purification plant operator, softening plant operator, superintendent. If men holding such positions are drafted, the utilities employing them may demand special consideration of their cases.

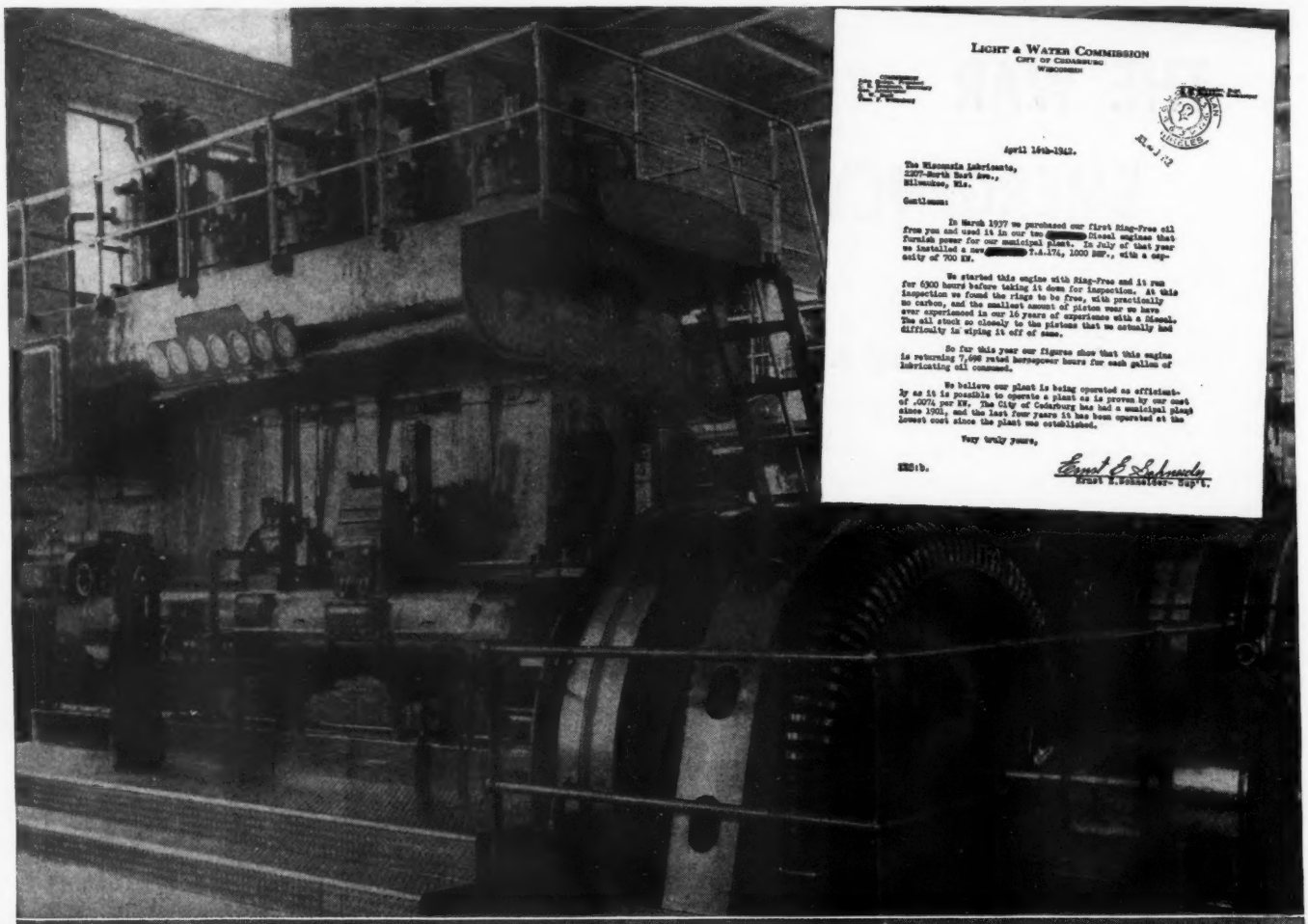
## Awarding Contracts for War Public Works

Bids for projects approved for Federal construction are opened at the FWA regional office, and contracts are awarded by the Federal Works Agency. Plans and specifications for these projects can be obtained from the office of that agency.

If a project is approved for non-Federal construction by the applicant, and bids are scheduled to be opened at the office of the applicant's representative, contractors who wish to submit bids should write to the architect or engineer or the applicant's representative for copies of plans and specifications.

In the future, a majority of the hospital buildings, schools and recreation centers approved for construction as war public works projects will be assigned by the Federal Works administrator to the Public Buildings Administration. a constituent unit of the Federal Works Agency. Plans and specifications for projects assigned to the Public Buildings Administration can be obtained from that agency or from the applicant's representative. They are not available in the FWA regional office. The deposit required for copies of plans and specifications ranges from $5.00 to $25.00, according to the scope of the project and the number of blueprints involved.

*See also "Preference Rating Procedure Up to Date" on page 32.*



LIGHT & WATER COMMISSION
CITY OF CEDARBURG
WISCONSIN

April 14th 1942.

The Wisconsin Lubricants,
2307 North Hart Ave.,
Milwaukee, Wis.

Gentlemen:

In March 1937 we purchased our first Ring-Free oil from you and used it in our two [redacted] Diesel engines that furnish power for our municipal plant. In July of that year we installed a new [redacted] V-8-174, 1000 BHP., with a capacity of 700 KW.

We started this engine with Ring-Free and it run for 6300 hours before taking it down for inspection. At this inspection we found the rings to be free, with practically no carbon, and the smallest amount of piston wear we have ever experienced in our 16 years of experience with a Diesel. The oil stuck so closely to the pistons that we actually had difficulty in wiping it off of same.

So far this year our figures show that this engine is returning 7,698 rated horsepower hours for each gallon of lubricating oil consumed.

We believe our plant is being operated as efficiently as it is possible to operate a plant as is proven by our cost of .007¢ per KW. The City of Cedarburg has had a municipal plant since 1901, and the last four years it has been operated at the lowest cost since the plant was established.

Very truly yours,

ESS:b. Ernst E. Schneider

Ernst E. Schneider- Supt.

# 1 Gallon to every 7,698 H.P. hours

THAT'S the average oil consumption recorded by The City of Cedarburg, Wisconsin so far this year.

The experience of the Light & Water Commission of Cedarburg is the subject of an article in August Diesel Progress where detailed figures, giving full credit to RING-FREE are given.

"The results have surpassed expectations," says Diesel Progress. "Not once in all the years of operation have the operators found a stuck ring. Careful records are kept of all maintenance work and they show that cylinder wear has been exceedingly small."

The Cedarburg authorities give a striking instance of the performance of RING-FREE in their letter of April 16, 1942. They started a new engine with RING-FREE "and it ran for 6300 hours before taking it down for inspection. At this inspection we found the rings to be free, with practically no carbon, and the smallest amount of piston wear we have ever experienced in our 16 years of experience with a Diesel," says Ernst E. Schneider, Superintendent.

Read the complete story in Diesel Progress for August, then write us.

MACMILLAN
PETROLEUM CORPORATION
50 West 50th Street, New York
624 South Michigan Ave., Chicago
530 West 6th Street, Los Angeles

**MACMILLAN RING-FREE MOTOR OIL**

Copyright 1942 by
Macmillan Petroleum Corporation

*When you need special information—consult the classified* **READER'S SERVICE DEPT.**, *pages 55-57*

PUBLIC WORKS Magazine . . . DECEMBER, 1942

VOL. 73. NO. 12

Laying 1½ inch top course. At left, a Barber-Greene distributor receiving a truck load of hot asphalt, with another truck standing by.

# Constructing an Airport on Florida Sands

By C. H. MONEYPENNY

City Engineer, Daytona Beach, Fla.

**The sandy soil offered a very poor foundation for the asphalt runway surfaces, and was conditioned by mixing a local marl into it 3 inches deep. Drainage required 8 miles of pipe and a half mile of canal.**

I SEEM to recall a famous quotation admonishing one not to build one's house upon the sand—but what is a feller to do here in Florida where, for endless miles, there is nothing but sand on which pine, palmetto and scrub oak abound? Well, we analyzed the situation and found a solution.

The sand in the vicinity of Daytona Beach is particularly interesting. Here there is a 20-mile long, gently sloping beach which is sometimes nearly 500 feet wide at low tide, with sand packed so smooth and hard that automobiles find the going smoother and easier than on some improved roads. It was here that Sir Malcolm Campbell drove his famous "Bluebird" at a speed of 281 miles per hour in 1935. This sand is so fine that better than 90% will pass a 60 mesh screen.

Now, the peculiar thing about this sand is that, although it will produce a hard, smooth surface on the beach as a result of the capillary action of the ebbing tide, yet this same sand offers a very poor foundation condition when dry and unconfined. Most local engineers and architects rarely assign it a bearing value of over 1500 lbs. per square foot where subsequent settlement is to be avoided.

In order to construct runways for an airport on this kind of soil, some conditioning of it was necessary, and we set about experimenting with local materials in order to reduce transportation costs to a minimum. First, it was apparent that stabilization of the sand subbase was going to be necessary; examinations of local road and street paving convinced us on

**Screen Analysis of Daytona Beach Sand**

| *Scale mesh* | *Percentage passing* |
|---|---|
| 28 | 100 |
| 35 | 99.75 |
| 48 | 98.50 |
| 60 | 95.50 |
| 100 | 16.25 |

Median diameter, 0.189 m m
Leaching test, 96% sand
Porosity test, 43% voids
Specific gravity, 1.48; Absolute specific gravity, 2.60

C. H. Moneypenny

that point at the very start. The only local material available for that purpose was marl, which is the nearest equivalent to clay that this part of Florida can produce. In using this, the runway areas were graded down to proper depth, then about 3 inches of loose marl was distributed over the area and cut in with a disc harrow, moistened with water and rolled and graded until a hard, smooth surface was obtained. This was our subgrade.

Then, after making various load tests, we found that a 3½-inch base course and a 1½-inch top course would produce the desired results. We laid a hot-mix base course consisting of 40-60% coquina shell, 20-40% red sand (which is somewhat coarser than the beach sand above described, but is obtainable in local pits) and 3 to 4% of 55 penetration asphalt. This was mixed at the plant and hauled approximately 5 miles in steel-body dump trucks, arriving at a temperature of 150° to 225° F. It was dumped into the hopper of a Barber-Greene road distributor, which deposited it on the previously prepared sub-base in strips 9 ft. wide and subjected it to an initial pressure of about 4 tons. This surface was allowed to cool sufficiently to allow the use of a 5-ton tandem roller on it, after which it was rolled until wheel marks were not noticeable. The top course was laid in a similar manner, but here we used a mixture of about 24% sand, 64% shell, 6% mineral filler and 6% asphalt of 90 to 100 penetration. The high-penetration asphalt was selected for the top course to prevent leaching from the effects of the sun. It has been found that, even though minute cracks appear on the surface due to temperature changes or other causes, subsequent traffic will cause these cracks to close because of the resilient nature of such a mixture.

These runways were 150 feet wide. Since snow, ice, sleet, etc., did not have to be considered in the design of the runways, we had only to study our local rainfall records to determine drainage requirements. We decided on a 6-inch crown, which was the minimum allowable under CAA regulations. Then, in order to provide as wide and comparatively level a surface as possible near the center of the runway to facilitate use in multiple takeoffs, we decided to use a modification of the parabolic formula, in which the square of the distance from the centerline of the runway toward the edge of the runway, expressed in decimals of a foot, equaled the drop in grade from the centerline of the runway. This gave an increasingly faster runoff near the edges of the runway where the volume of the water would ordinarily increase.

Of course, drainage of the entire airport area was one of the problems encountered. The average elevation of the airport was about 30 feet above sea level and it is two miles away from the ocean. Bordering the eastern side of the airport, between the airport and the ocean, was a sand ridge 69 feet high. To the north, south and west, there were miles and miles of level country offering no quick drainage solution. So we put draglines to work on the ridge, cutting through an outlet canal 20 feet wide on the bottom with 2 to 1 side slopes, using the sand material so removed for grading the airport proper. This canal leads to a main irrigation drainage canal about ½ mile away. A rim canal was provided around the perimeter of the field connecting with the outlet through the ridge. Catch

Plant of the contractor, the Frank Construction Co., at Daytona Beach.

**Placing 1½ inch top course. 5-ton tandem roller in left foreground. Barber-Greene distributor at right, with flood light on standard on left side for night work**

basins with tile outlets were provided for enclosed areas between runway intersections, with metal culverts (Armco arch, because of limited headroom) under the runways leading to the nearest rim ditch. For carrying off the drainage water, 42,000 feet of 6" to 18" vitrified clay pipe were used, laid with open joints.

The drainage system thus provided got a real tryout just a few days after completion of the 304,000 square yards of paving, when a 13-inch rainfall within a period of 36 hours revealed no defects and had no harmful effect on the installations. The runways were in actual use during one period in which a rainfall of 2.25 inches per hour was recorded. In fact, this airport was the only one in Florida which was not damaged or rendered unfit for use during this unusually heavy precipitation.

Side slopes or berm slopes were graded off away from the runways at the rate of 6 to 12 inches per 100 feet, depending upon the material readily available and the natural contour of the ground.

It was interesting to note that two "belly landings" by high speed training planes on this pavement failed to damage either the pavement or the planes excessively. Three or four small nicks were gouged out by the revolving propellers, and the planes left only a thin skin of paint and metal on the runways. Neither plane nosed over.

These 150-foot runways are now in process of being widened. This is being accomplished easily by simply removing the necessary sand from each side of the runway and providing a marl subbase as before. The original edges of the surface are cut back a few inches to insure substantial foundations, the top course being cut back a few inches more than the base course to provide lapping of joints.

This type of pavement is more easily patched successfully than any other similar type. It is necessary only to remove the original material by means of picks and shovels, tamp the base course, place the top surfacing, screed off and roll until compact.

The cost of this paving job complete was well under $2.00 per square yard. No depressions have developed since completion of the paving.

## Restoring Streets After Sewer Construction

In an article under this heading in our November issue, page 23, appears the statement "After the first winter there are signs of the roads having been disturbed by the sewer construction, and the riding qualities seem to be excellent." This should have been "there are *no* signs of the roads having been disturbed."

We greatly regret this mistake. How it escaped both the printer's proof reader and our own is one of those questions to which there does not seem to be an answer.

## Road Maintenance in Wartime England

Writing to "The Surveyor", an English engineering paper, a county surveyor gives an idea of how that country is keeping its roads in condition. He says:

"While it is recognised that highway improvements, apart from military considerations, cannot be carried out, the maintenance of our road surfaces is of vital importance at the present time, and while it may be possible to effect economies over a limited period, it is generally agreed that surfaces must be maintained at such a standard as to facilitate the rapid movement of our large mechanised army. Furthermore, they should not be allowed to deteriorate to such an extent as to necessitate a huge expenditure on reconstruction in the early days of peace, as was the case after the last war.

"Nevertheless, some economies must be effected, old and well tried methods of maintenance will have to come under examination, roads which in normal times would be entirely reconstructed may have to be provided with a thin carpet coat only, while others which in the ordinary way would be resurfaced will, in all probability, be treated with a dressing of tar and chippings.

"Under war time conditions, surface dressing is the method most extensively adopted for maintaining the surface of large mileages of roads, particularly in rural areas; the advantages are that the operations can be carried out with comparative speed, and it is often possible to use local covering down materials.

"The length of roads in this country which prior to the war were surface dressed, was approximately 107,000 miles and it is likely that during the period of hostilities the mileage so treated will considerably increase.

"The majority of rural roads have no properly constructed foundations but providing the surface is kept properly sealed to prevent the surface crust from disintegrating the road will usually stand up to normal traffic. It is in this connection that tarspraying has given such satisfactory results at comparatively low cost."

# Installation of

**By CHARLES L. LINK**
**Manager Elkhart City Water Works**

**Poroswall pipe on gravel bed, showing sheet piling. Author taking a drink of the clear ground water.**

THE water supply of the city of Elkhart, Ind., comes from two sources; deep wells equipped with turbine pumps, and large dug wells fed by galleries, from which we pump by both steam and electrically driven centrifugal pumps.

A number of years ago wood was considered very satisfactory for the construction of galleries, and in 1884 a wood gallery 24″x24″x270′ was installed, connecting two dug wells, each 39′ in diameter and 40′ deep. The gallery was constructed so that it would deliver from well No. 2 to No. 1, and also collect from the formation between the two wells. The water is pumped from No. 1 to a reservoir.

The results were satisfactory for a number of years, until there was a cave-in about midway between these wells. After this had been repaired (which required considerable excavating), the gallery collected considerable water until six years ago, when the capacity of the well dropped very noticeably. This, in addition to a gradual increase in demand, necessitated a change in pumping, which caused a slight increase in cost, as we were forced to shut down one pump and use another which drew from the reservoir supplied by electric pumps. This double pumpage was originally intended to be used less often.

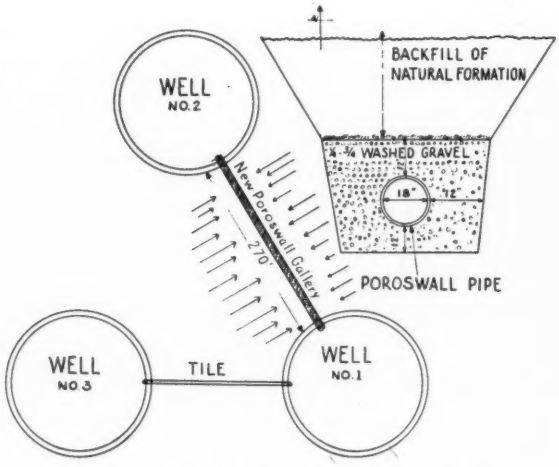
Our steam pumps have been in service since 1893 and will not operate safely with much of a lift, about 16 ft. being the maximum safe head without breaking valves, springs, or studs. It was therefore necessary to keep No. 1 well as full as possible during the pumping period.

In the summer of 1936 we installed two deep wells, gravel packed, and equipped them with turbine pumps, automatically controlled. This relieved the steam plant some; however, it did not solve our problem entirely. Also we found it impractical and very costly to clean and repair the old wood gallery.

Last summer, we checked soil and ground water conditions, and found the formation ideal in every respect for an ample yield for many years to come. We then investigated various types of conduits and materials which we could use for the construction of a new gallery, making tests with several samples, and after recording the results of each we decided to use 18″ "Poroswall" concrete rapid drain pipe, made by Walker Cement Products Co. This material is a fast drainage medium, extremely permeable for its entire circumferential area; there are no open joints to permit the entrance of dirt or other matter and which would require wrapping, and its interlocking, self-centering joints cut laying costs more than half.

**Excavating trench for gallery. 30″ reservoir suction line in foreground.**

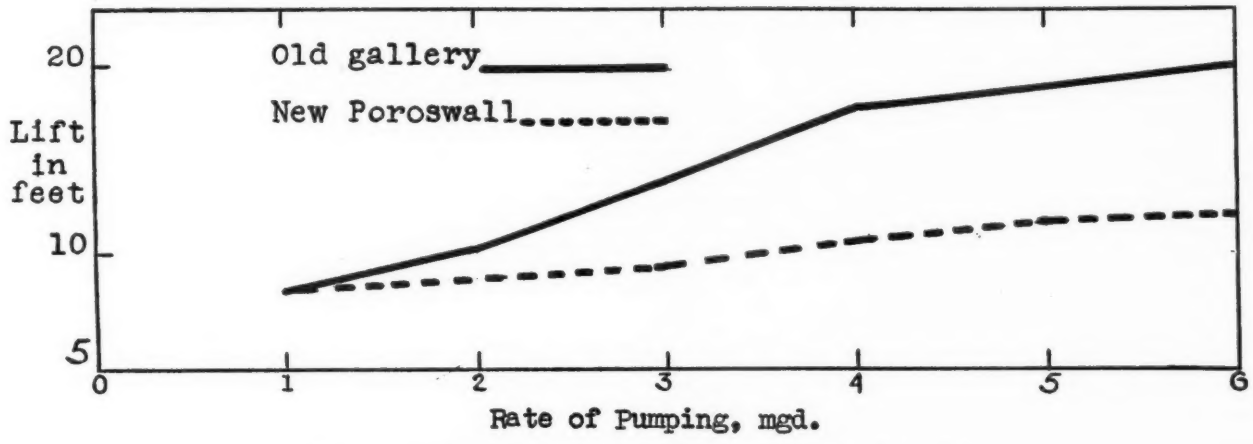
**Going under the 30″ reservoir suction line.**




**General layout of wells and cross-section of new gallery.**

# ew Gallery in Elkhart, Indiana

**A wooden gallery built in 1884 needed frequent expensive repairs and was replaced with one of 18-inch porous pipe, which greatly increased the yield.**




**Lift of pump required by old and new galleries at various rates of pumping.**

## The Installation

Excavation for the gallery required removal of a great amount of earth, the trench being 24′ deep and approximately 50′ wide at the top tapering to 12′ at bottom. At the bottom of this, sheathing was driven to a depth that would permit us to lay the conduit 22′ below the level of the ground. A gravel wall 12 in. thick on all sides of the pipe was placed, followed by a small amount of backfill of natural formation. We installed about 27 ft. (nine sections) at a setting and gravel packed it at the same time.

**Construction of new gallery nearing completion.**

Since the static level at this time was 9 ft., we were forced to install an electric pump on the top of well No. 1 to keep the water low enough to permit working at the bottom of the trench. During this time we were pumping from well No. 3, which also is connected to No. 1. Even so, the men were forced to work in 2′ of water to install this gallery. The gallery was laid level, and all the wells were connected, which permits the water to seek its level in No. 1 during pumping.

At first it was thought advisable to construct a manhole midway between the two dug wells so that if, in the future, it should become necessary to clean the gallery we would have a shorter run in both directions. However, since the installation of the old wood gallery very little iron deposit had been found in the formation, and it seemed probable that the uniform gravel wall which we put around the Poroswall pipe will prevent clogging for many years to come; therefore this manhole was omitted.

As we removed the earth for the new conduit, samples of the formation were taken every three feet and placed in containers, which were labeled and stored

*(Continued on page 41)*

# Wartime Problems in Refuse Collection and Disposal

**Difficulties experienced in maintaining personnel, equipment and disposal facilities, with special reference to Washington, D. C.**

WARTIME conditions are presenting difficult problems in refuse collection and disposal, in the several phases of maintaining personnel, equipment and disposal facilities. These were discussed by Wm. A. Xanten, Supervisor of the City Refuse Division of Washington, D. C., in a paper before the 1942 Public Works Conference, of which the following is an abstract.

### Personnel

There is serious difficulty in maintaining a sufficient force of skilled and unskilled labor and necessary key men, not only because of the draft but even more because they leave for more lucrative positions. Replacing them, even with inexperienced men, is difficult because collection is strenuous work and many new employees leave after a few days' service. During the past eight months Washington has hired over 600 men, only one out of 8 to 10 remaining in service for more than one or two pay days. The loss of key men is especially serious. Refuse is being created daily in ever increasing quantities and *must* be removed and disposed of. A large part of the refuse is not salvageable, either before or after collection. And collection just can not be performed without a reasonable supply of labor and truck equipment.

### Equipment

Since March 9th it has been impossible to obtain new trucks except upon an allocation from the ODT and War Production Board; and although trucks for municipal sanitation are classified in Class 1, they are practically unobtainable. There are today only approximately 5,000 new heavy trucks (16,000 lb. or over gross weight) in the country for all purposes. Of light trucks a much greater number are obtainable.

Washington has for months been trying to obtain 34 trucks to augment a refuse fleet 50% of which is from 8 to 15 years old, and which has to serve a population increased by 150,000 because of the influx of war workers, but only recently has it been able to obtain an allocation of 8 trucks. We have searched for used trucks, but to date have been able to purchase only 12. These are 6 to 8 years old, in good condition but of conventional design, with wheel base too long for operation through narrow alleys and therefore suitable only for incinerator-ash hauling and wrecker duty and of no assistance to the collection fleet. The extent to which control by the ODT over the use of commercial vehicles will provide added equipment for the more essential uses will be awaited with interest.

This condition adds to the importance of maintaining the present equipment. Procurement of repair parts (except for some very old trucks) has been troubled mainly by delay rather than by absolute failure; but it seems probable that obtaining parts will become increasingly difficult. Consequently we are salvaging as much as possible from superannuated equipment which normally would be sold as junk. We are retaining rather than turning in such equipment as we are able to replace and keeping our eyes constantly on the market for second-hand parts. Priorities are granted for procuring necessary parts and replacements but there is lack of suitable priority procedure to cover the situation when immediate repairs are necessary upon unexpected breakdowns of essential plant machinery and equipment.

### Disposal of Trash

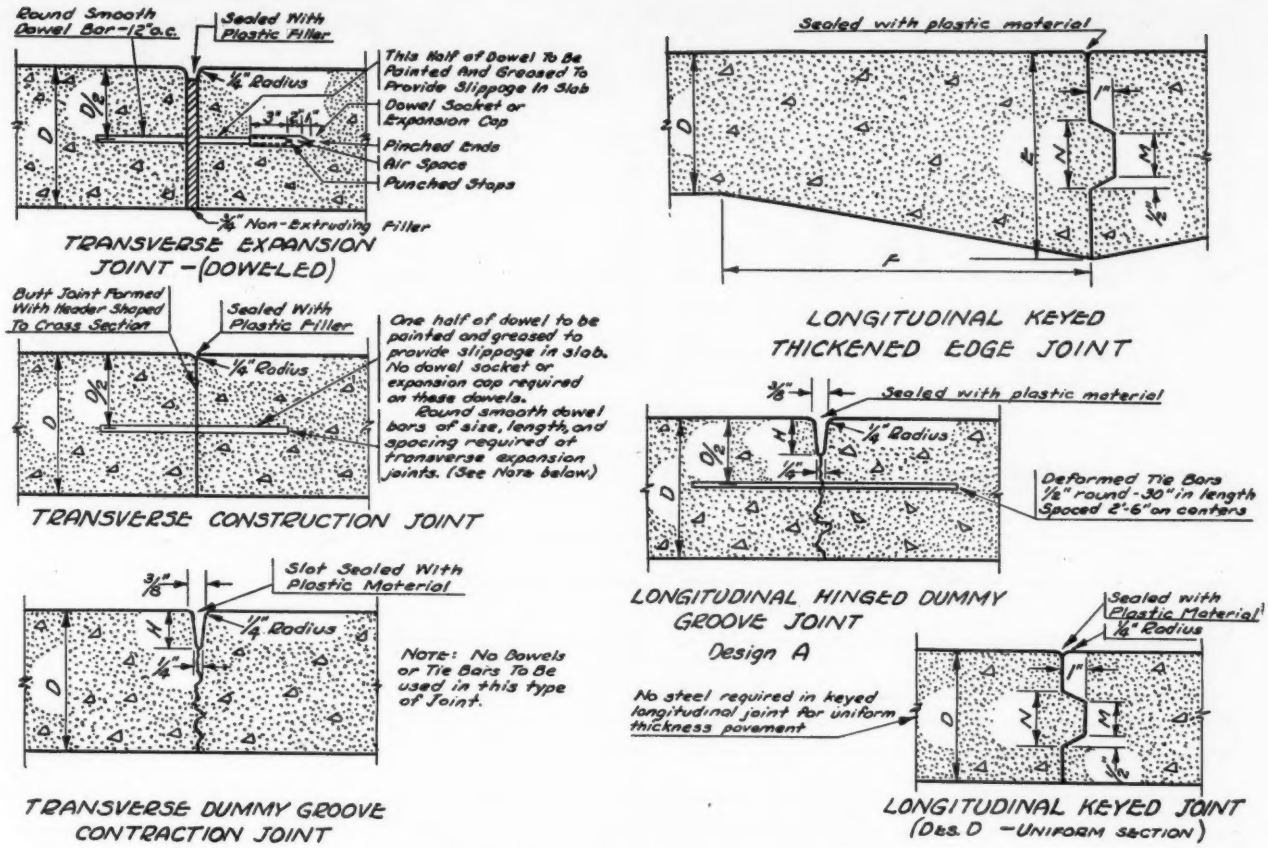
Washington's trash problem has expanded enormously with the 150,000 addition to its population. It operates two incinerators that were estimated, when constructed in 1932, to have sufficient capacity until 1950, but the trash production today exceeds their capacity by over 50,000 tons a year. Congress appropriated funds for a 255-ton incinerator and plans were made eliminating the use of strategic materials as far as possible; but it still required a certain amount of steel, machinery, wiring, plumbing etc., and no priority rating could be obtained for it.

It was stated in the application for priority that the ash from the incinerator would contain metal estimated at 3,500 tons annually—much more than the amount required for the building and equipment; but the WPB believed that, as wartime conservation progresses, the number of metal containers in the trash will decrease. Moreover, the recent prohibition by WPB of the shipment to steel mills of tin can bundles, due to the hardening of the steel imparted by the tin, has virtually eliminated the recovery of metal from the incinerator ash.

The obvious alternative is land fill. The 600,000 cu. yd. annually of trash in excess of incinerator capacity would cover 40 acres 10 ft. deep each year, and such large areas of suitable low ground are not available in the District of Columbia; and an unobtainable number of trucks and trailers would be needed to transport it to a distance from the city; and it would be difficult or impossible to find land whose owners would permit the placing on it of unstable fill subject to settlement and spontaneous combustion.

Trash (Washington's garbage is disposed of by reduction and hog feeding) is reduced 90% in volume by burning, and the solution adopted was to burn it on open ground in a highly settled area along the Anacostia river. Although close control of this is ex-

*Continued on page 20*


Round Smooth Dowel Bar-12"o.c.
Sealed With Plastic Filler
This Half of Dowel To Be Painted And Greased To Provide Slippage In Slab
1/4" Radius
Dowel Socket or Expansion Cap
Pinched Ends
Air Space
Punched Stops
1/4" Non-Extruding Filler
TRANSVERSE EXPANSION JOINT - (DOWELED)
Butt Joint Formed With Header Shaped To Cross Section
Sealed With Plastic Filler
1/4" Radius
One half of dowel to be painted and greased to provide slippage in slab. No dowel socket or expansion cap required on these dowels.
Round smooth dowel bars of size, length, and spacing required at transverse expansion joints. (See Note below)
TRANSVERSE CONSTRUCTION JOINT
3/8"
Slot Sealed With Plastic Material
1/4" Radius
1/4"
Note: No Dowels or Tie Bars To Be used in this type of Joint.
TRANSVERSE DUMMY GROOVE CONTRACTION JOINT
Sealed with plastic material
1"
F
LONGITUDINAL KEYED THICKENED EDGE JOINT
3/8"
Sealed with plastic material
1/4" Radius
1/8"
Deformed Tie Bars 1/2" round - 30" in length Spaced 2'-6" on centers
LONGITUDINAL HINGED DUMMY GROOVE JOINT
Design A
Sealed with Plastic Material
1/4" Radius
No steel required in keyed longitudinal joint for uniform thickness pavement
LONGITUDINAL KEYED JOINT
(Des. D - Uniform Section)

**Details of the various pavement joints.**

# Wartime Construction of Concrete Pavements

**Modifications of proportions and details recommended by the Highway Research Board and the Portland Cement Association to minimize use of steel and other critical materials.**

WARTIME transport requires the construction of a considerable mileage of highway and street pavements adequate for carrying heavy and intense traffic with a minimum of wear or damage, in many cases replacing a less durable pavement. At the same time, the use of critical materials must be eliminated or reduced to a minimum. In the case of concrete pavements, the critical materials commonly used are steel, burlap (for curing), and certain forms of asphalt used for fillers and curing.

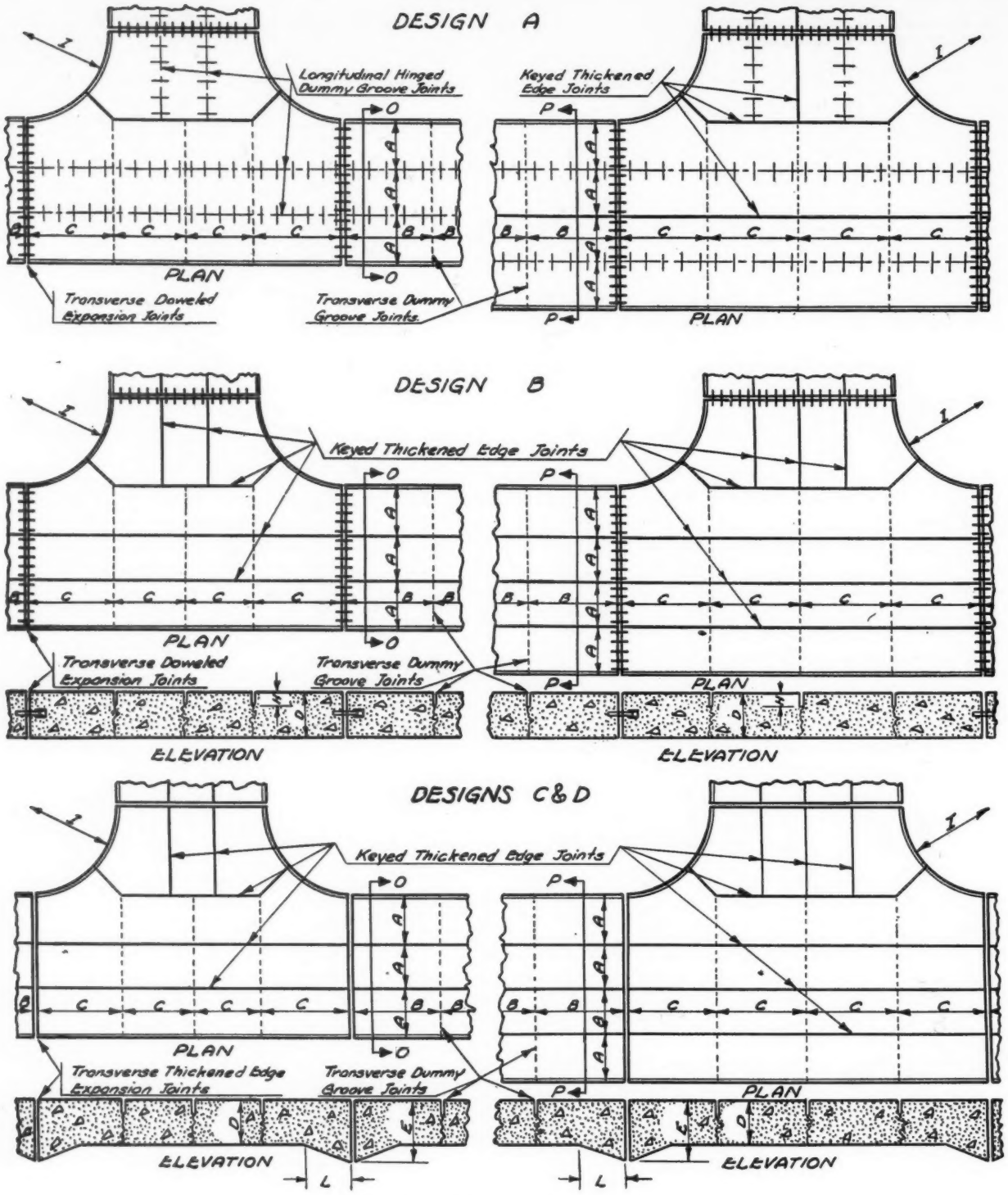
The Highway Research Board has prepared several bulletins on "Curing Concrete Pavements Under Wartime Restrictions on Critical Materials," "Design of Concrete Pavements Requiring a Minimum of Steel," "Maintenance Methods for Preventing and Correcting the Pumping Action of Concrete Pavement Slabs," and "Design of Highway Guards." A few weeks ago A. A. Anderson, Manager, Highways and Municipal Bureau, Portland Cement Ass'n, read before the Public Works Congress a paper on "Essential Wartime Revisions in Design and Specifications for Concrete Street Pavements."

The following article has drawn upon all of these, but chiefly upon Mr. Anderson's paper, for the information and illustrations contained therein.

The most important of the critical materials used in concrete paving is steel. This is used as distributed reinforcement, for load transfer devices at joints, for tie bars, and for deformed metal plates in longitudinal joints.

*Distributed reinforcement* does not, if limited to practicable quantities, increase the load-carrying capacity of concrete or prevent cracking, but its purpose is to prevent cracks from opening after they form. Its need can be eliminated if the formation of cracks is prevented, and this can be effected by placing contraction joints of the top dummy groove type at intervals not exceeding the following:

| *Type of Coarse Aggregate* | *Spacing of Contraction Joints* |
|---|---|
| Crushed granite | 25′ |
| Crushed limestone | 20′ |
| Crushed flinty limestone | 20′ |
| Calcareous gravel | 20′ |
| Siliceous gravel | 15′ |
| Gravel less than ¾" in size | 15′ |
| Slag | 15′ |

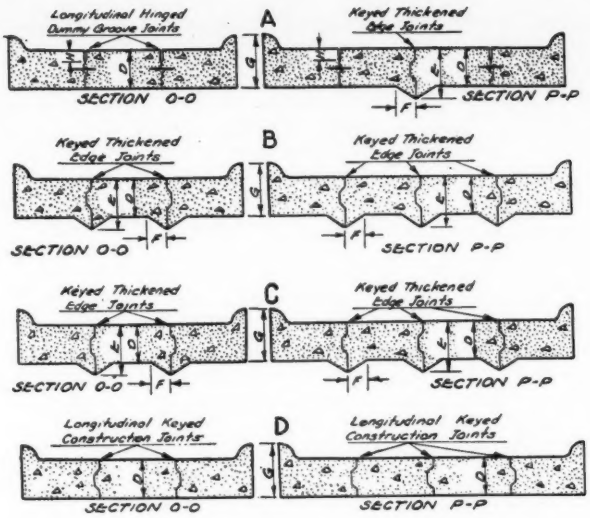



**Details of the four designs, showing street intersections.**

The dummy groove joints may be constructed by providing in the top of the slab a groove having a depth equal to ¼ the thickness of the pavement and filling this with a suitable plastic filler to exclude inert material; or by inserting in the top of the slab a thin premoulded filler having a width of ¼ the pavement thickness.

It is recommended that expansion joints be spaced not less than 300 nor more than 600 ft. apart; except that one be placed at each side of each street or road intersection. Both theory and field experience and observation indicate that 600 ft. spacing will not cause excessive compressive stresses in pavement slabs if infiltration of inert material at transverse joints is prevented; in fact, if expansion joints were omitted altogether the compressive stresses would not exceed 50% of the ultimate compressive strength of the concrete, providing growth in length of slab from infiltration of soil is prevented. It is suggested that low-cost non-extruding type of filler be used in expansion joints, such as boards and treated fiber. By reducing the number of expansion joints, the amount of steel required for dowels or other load transfer devices is reduced also.

*Load Transfer Devices.* Dowels at expansion joints form part of the most economical design, but they can




**Cross-sections of the several designs of pavements. For dimensions, see text in the adjoining column.**

be eliminated by thickening the pavement slab at the joint so that it will be structurally adequate without dowels. The thickness at these joints should be the same as that of the edges in thickened-edge designs; or 1.12 times the thickness in the case of slabs of uniform thickness; the taper from this thickness to the normal being uniform and effected in from 5 to 10 ft. distance.

No dowels are necessary at transverse contraction joints of the dummy grooved type. If these joints are spaced as recommended, they open so little, even during extreme pavement contraction, that the irregular faces of the concrete below the groove give adequate load transference.

*Tie bars* are required across longitudinal joints in the thin central portion of thickened-edge pavements to hold the faces of the slabs tightly in contact at such joints, so that the interlock of the aggregate (in the dummy groove type of joint) or the key (in the deformed metal type of joint) will provide adequate load transference. They operate entirely different from dowels, being in tension while dowels function in bending and in shear.

Tie bars can be eliminated either by using the uniform thickness design of pavement, or by thickening the edges at *all* longitudinal joints. By elimination of tie bars, about 75 lb. of steel per 100 ft. of joint can be saved.

*Deformed metal plates* at the hinged longitudinal joint may be eliminated by using instead the dummy groove type, thus saving the steel required for the plates.

## Designing a Concrete Pavement

The accompanying drawings show four different designs embodying the suggestions described. Design A is a thickened-edge pavement which requires steel for expansion joint dowels and for tie bars. Design B also is a thickened-edge slab, but the tie bars have been omitted, all slab edges being thickened at longitudinal joints. In Design C, dowels also are omitted, the slab ends being thickened at expansion joints, and no steel is required. Design D also uses no steel, being of uniform thickness throughout. The differences in cost between A, B and C are small, A being the most economical. D requires more concrete than the other designs, but is somewhat simpler to construct.

## Dimensions for the Several Designs, for Each Class of Traffic

Class I—Heavy trucks with occasional wheel loads of 11,000 lb.

Class II—Wheel loads seldom exceeding 9,000 lb.

Class III—Wheel loads seldom exceeding 7,000 lb. and volume of traffic less.

Class IV—Wheel loads seldom exceeding 6,000 lb. and comparatively little traffic. For all designs and all classes, $A = 8'$ to 12.5'; $B = 20'$; $C = 10'$ to $20'$.

$D$ for designs A, B and C $= 6.7''$ for Class I, $6''$ for Class II, $5.5''$ for Class III and $5''$ for Class IV. For design D it is $8''$ for Class I, $7''$ for Class II, $6.5''$ for Class III, $6''$ for Class IV.

$E$ for designs A, B and C $= 10''$, $9''$, $8''$ and $7.5''$ for Classes I, II, III and IV respectively. For design D it is $9''$, $8''$, $7.5''$ and $7''$ respectively.

$F$ is $2''$ in all cases.

$G$ is D + $5''$ in all cases.

$H$ for designs A and B $= 1\frac{3}{4}''$, $1\frac{1}{2}''$, $1\frac{1}{2}''$ and $1\frac{1}{4}''$ respectively. For design D it is $2''$, $1\frac{3}{4}''$, $1\frac{3}{4}''$ and $1\frac{1}{2}''$ respectively.

$I$ is variable for all cases.

$L$ is 5' minimum in all cases.

*Amount of steel* required per 1,000 sq. yd. is as follows: For design A, 3-lane, 637.7 lb. for Classes I and II, 499.6 for Classes III and IV. For 4-lane, 538.9 lb. for Classes I and II, 400.6 lb. for Classes III and IV.

For design B, 3-lane, 238.6 lb. for Classes I and II, 100.5 lb. for Classes III and IV.

For 4-lane, 239.0 lb. for Classes I and II, 100.7 lb. for Classes III and IV.

No steel is required for designs C and D.

*Cubic yards of concrete* required per 1,000 sq. yd. for design A = 191.19, 171.73, 157.78 and 143.91 for Classes I to IV respectively. For 4-lane, add about 1.6%.

For design B, 3-lane, 203.34, 182.76, 166.97 and 153.09 respectively. For 4-lane the amount is only 0.29 cu. yd. greater for Class I, and is 0.08 cu. yd. less for Class IV.

For design C, 3-lane, 207.08, 186.16, 169.81 and 155.93 for the four classes respectively. For 4-lane the amount is 0.19 cu. yd. greater for Class I, 0.16 cu. yd. less for Class IV.

For design D, 3-lane, 228.34, 200.56, 186.67 and 172.79 respectively. For 4-lane, 1.22 cu. yd. less in each case.

## Calculating Pavement Thickness

The pavement thickness can be computed by the formula $d = \sqrt{\frac{1.92\ Wc}{S}}$

in which d = depth in inches of a uniform thickness slab,

w = the static wheel load, carried on pneumatic tires. (Impact allowance is provided for in the 1.92.)

c = coefficient of subgrade support

S = the allowable working stress.

W is generally taken as 11,000 lbs. for heavy-duty thorofares in industrial or commercial areas where a large part of the traffic consists of heavy trucks, but may be as little as 6,000 lbs. for light-traffic streets. (Occasional loads up to double this should not rupture the slab.) Coefficient c varies from 1.096 where the subgrade has a bearing value of 5 lb. per sq. in. to 0.77 where the bearing value is 50 lb.; 1.0 would suffice for the poorest soils usually encountered. A value of 350 for S is conservative (allowing a factor of safety of 2). Present-day mixes usually have moduli of rupture well in excess of 700 lb. per sq. in.

This formula is for uniform thickness. At expansion joints without load transfer devices and without steel, the edges should have a thickness equal to 1.12 d. The interior thickness of thickened edge slabs should be 0.85 d and the edge thickness 1.275 d.

The drawings and accompanying notes give the dimensions and quantities for each of four classes of traffic, for each of the four types of design described.

## Curing Pavements

There are two general methods of curing concrete: 1—Supplying needed water throughout the hydration

process and maintaining a uniform temperature. 2—Preventing loss of water with little if any influence upon temperature. (Dark colored films tend to increase temperature variations.)

The first method includes ponding, sprinkling, spraying, use of wet burlap or cotton mats, or of wet earth, sand, sawdust, hay or straw. The second method uses waterproof paper or impermeable membranes, the latter including membrane curing compounds,* calcium chloride and sodium silicate.

Burlap is not now available. Methods sanctioned by current practice using materials available are:

Wet cotton mat coverings for entire curing period.

Initial wet cotton mat coverings followed by application of continuous sprinkling; ponding; coverings of wet earth, sand, sawdust, straw or hay; waterproof paper; membrane seal coats; or calcium chloride.

Seal coats of membrane compounds or waterproof paper.

Also, in lieu of initial wet coverings or seal coats, the conditions of good curing may be met by keeping the surface wet by means of a fine spray of water. This method has been used but the work must be done in such a way that the surface will not be injured and will not have a chance to dry between applications. This necessitates that the spray be very fine, little more than a mist.

For initial curing, the following procedure is recommended: a—As soon as possible without marring the surface, cover the concrete with cotton mats, which are to be kept wet throughout their period of use. b—If mats are not available, as soon as the free water has disappeared from the surface it should be kept wet continuously by means of a water spray of such fineness and so applied that the surface will not be marred.

Following 6 hrs. of initial curing, the concrete should be further cured until 72 hours has elapsed after the beginning of the initial curing, using one of the following procedures: c—Cotton mats used in *a* left in place and kept continuously wet. d—Sprinkling during daylight hours. e—Ponding. f—Wet earth, sand or sawdust, applied in a layer not less than 1 in. thick, and thoroughly wet. g—Wet straw or hay, applied 6" thick and kept thoroughly wet. h—Waterproof paper, applied after a thorough wetting of the surface, the sheets lapping at least 18" and held in intimate contact with the surface. i—A non-bituminous membrane seal coat. j—Sodium silicate.

Methods to be used after 16 hrs. of initial curing are: k—Bituminous seal coats. l—Surface application of calcium chloride, the concrete first being thoroughly wet and calcium chloride then being applied uniformly at the rate of 1.5 lb. per sq. yd. m—Calcium chloride can also be used as an admixture in the concrete, to accelerate the hardening of the concrete, in which case no further curing will be required after 16 hrs. of initial curing. The calcium chloride should be added to the concrete mixture, either dry or in solution, as follows: 2 lb. per bag of cement at temperatures below 80° F.; 1.5 lb. between 80° and 90°, or 1.0 lb. at temperatures above 90°. When used dry, it is placed in the skip of the concrete mixer with the aggregate, but not in contact with the cement. In solution, it is introduced into the mixer drum with the mixing water, replacing an equal volume of mixing water.

In applying sodium silicate or seal coats, after all free water has disappeared all exposed surfaces of the concrete are sealed by spraying thereon as a fine mist a uniform application of the material so as to provide a continuous, uniform, water-impermeable film without marring the surface. A second coat should be applied if necessary to produce a film that will retain for 72 hrs. at least 85% of the original water used in the mix. (Some films retain over 90%.)

*A recent addition to the membrane curing compounds is "Tru-Cure," made by Truscon Laboratories.

## Wartime Problems in Refuse Collection and Disposal

*(Continued from page 16)*

ercised by quenching fires at night, the smoke and fumes caused by burning during the day create a decided nuisance and have led to threats of suits for injunction.

With burning in the open as apparently our only solution, we are establishing more elaborate facilities for it. About 7500 ft. of concrete roadway is being constructed to the disposal area, to minimize wear of the trucks. An old pumping engine was borrowed from the Fire Department and installed in a shed on the bank of the river, an intake built, and a supply of old fire hose obtained, to provide for night quenching of fires.

### Garbage

Washington's reduction plant produces a large amount of grease needed in war industries, which contains about 12% glycerin. This brought a good price, but OPA set a price ceiling of 6⅞ cts per pound on garbage grease. (In World War I the price rose to 13 cts.)

Use of garbage for hog feeding has been prevented in the case of some cities by an amendment to the U. S. Public Health Service's quarantine regulations requiring that all garbage shipped inter-state shall be cooked before being fed to hogs, with a view to controlling trichinosis. Farmers can ill afford the additional expense of cooking, even if the equipment necessary could be obtained, which is doubtful. The enforcement of this regulation presents to some cities a serious problem, as construction of incinerators, reduction plants, grinding stations, etc. is practically impossible. Also the nation would be deprived of many hog-producing farms.

### No Negligence in This Unguarded Excavation

The alleged negligence of a water company in leaving unguarded and unbarricaded an excavation in a street did not, it was held (Sullivan v. Wakefield Water Co., Rhode Island Supreme Court, 15 Atl. 2d 23) make the water company liable for injuries to a child of three and a half who fell into the excavation from the sidewalk on which she was riding a tricycle on a sunny afternoon, although defendant's workman had noticed small children playing on the sidewalk and had once warned them to keep away from the excavation.

Negligence of the water company, the court said, was dependent on the circumstances of the accident. Distinguishing cases of accidents occurring in the night time or when knowledge of the excavation could not reasonably be charged to the person injured, the court found no case in which a defendant has been held liable where the excavation was plain and visible and therefore must have been seen by any person exercising reasonable precaution for his own safety in using the highway. Judgment was therefore directed for defendant.

# Eliminating Dead Ends for Fire Protection

By C. E. HARRISON
Superintendent Light and Water Plant, Oxford, Miss.

C. E. Harrison, Superintendent of Oxford Light & Water Plant.

**By connecting all dead ends, using two miles of pipe for the purpose, and making other improvements, the city obtained a raise in insurance rating from 9th class to 7th.**

THE first water system of Oxford, Miss., a city of about 3,000 population, constructed in 1896, consisted of two 8″ deep wells, a 100,000 gal. reservoir, a 65,000 gal. elevated tank, and a distribution system consisting of a loop of 8″ pipe around the public square with 6″ and 4″ laterals leading from it to the residential section. Deposits of minerals from the water reduced the capacity of the mains, and when a 750 gpm pumper truck was purchased in 1928 there were many places in the city where it could not obtain sufficient water to operate.

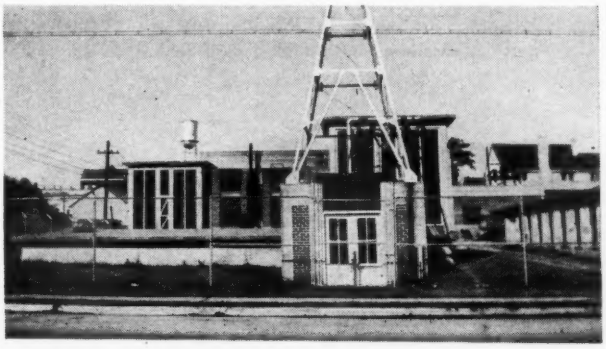
The city had been placed in the 9th class by the State fire insurance rating bureau and asked what could be done to have the rate lowered. The bureau's recommendations involved more expenditure than the city thought it could afford, but it converted its pumps to electric drive; later it replaced the old wells with an 18″ Layne gravel-wall well with a turbine pump. Nine years later, in 1933, a new 500 gpm Dayton-Dowd pump with 40 hp motor was added to the old 260 gpm pump, a 200,000 gal. reservoir was built, and a 10″ main laid from this to the pumps. Also a new 20″ gravel-wall well was drilled.

Again asked to lower the rates, the State Rating Bureau reported that if the city would eliminate certain dead-ends by connecting them together, provide two fire pumps, a coded type of fire alarm and certain additions to the fire fighting equipment, it would be placed in the 8th class, with a 20% lowering of insurance rates.

The city engineer, R. S. Myers, was instructed to prepare plans for meeting these requirements as a WPA project. His plan included connecting all dead-ends and installing 9 additional fire hydrants, each equipped with one 4½″ and two 2½″ nozzles; replacing six old valves with new ones, reconditioning others and inserting 18 new valves. In connecting the dead-ends, 11,618 ft. of 6″ c.i. pipe was used. This project cost the city $14,206 and WPA $20,267.

In installing the valves we used flanged valves, with a flanged bell nipple bolted to one end and a flanged spigot nipple to the other, which enables us to remove a valve easily when desired. A manhole was constructed over each valve.

Two new Worthington fire pumps were installed at the pumping plant, each having a capacity of 1,000 gpm against a head of 231 ft., direct connected to Westinghouse, 75 hp, 2300 volts, slip ring motors, controlled by manually operated drum-type starters.

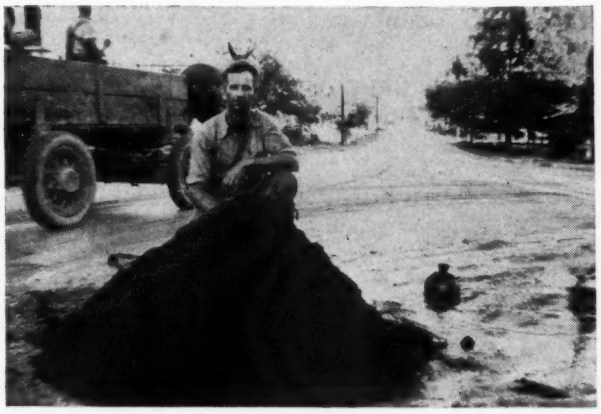


Power house and pumping plant. At left, reservoir and aerators, with elevated tank in the distance. In the center a Layne well.

The last step was cleaning approximately 33,000 ft. of old mains, which was done by the Flexible Underground Pipe Cleaning Co. of Los Angeles, and restored the old mains to almost their original capacity.

After the mains had been cleaned we experienced a great deal of trouble with red water in mains where the circulation was slow. Flushing these mains regularly for several months did not remedy it. At last we decided to try Calgon treatment of the water, with very good results as we no longer are troubled with red water.

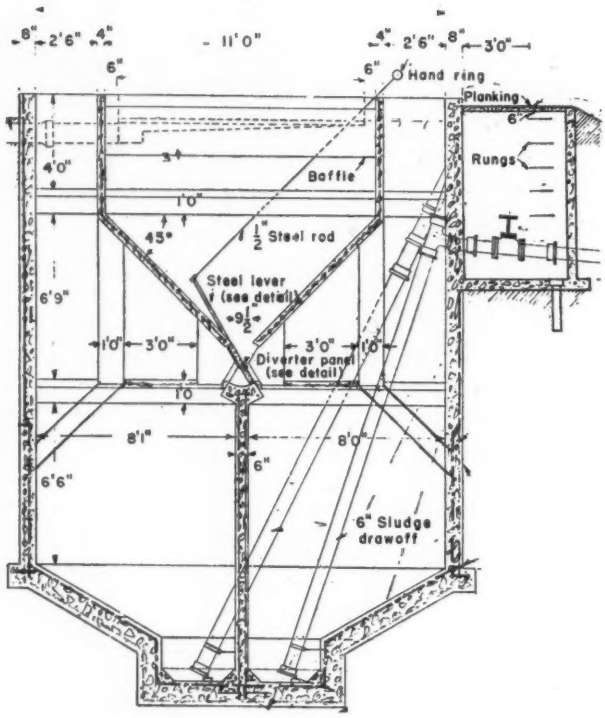
Upon completion of this project the Rating Bureau found conditions so much improved that they gave us a 7th class rating, reducing the insurance rates 30% on an average and even 42% in some special cases.



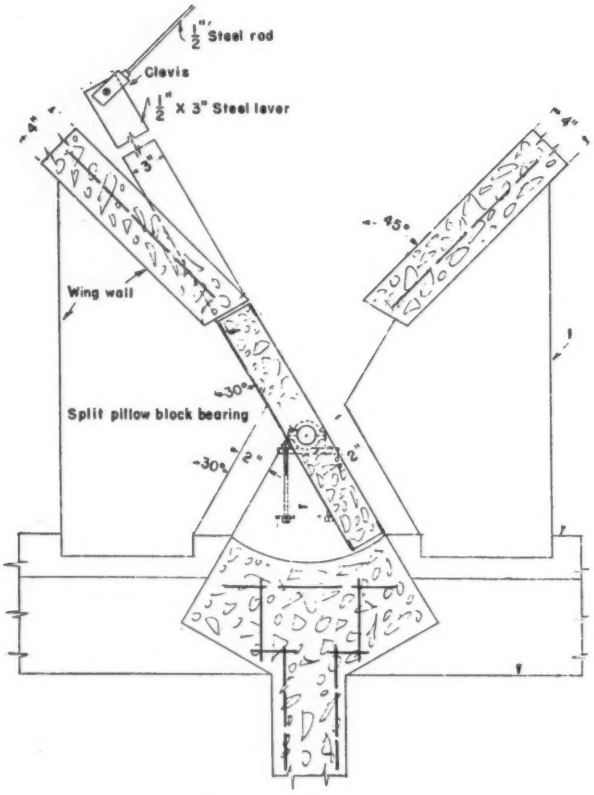
Pile of scale removed from 1,000 ft. of 6″ main.

# Sewage Treatment Plant fo

**By B. V. HOWE**
**Director, Division of Sanitary Engineering,**
**Colorado State Board of Health**




**Section GG through Imhoff tank.**




**Details of diverter panel.**

COLORADO'S State Home and Training School for Mental Defectives, located about three miles southeast of Grand Junction, is an old Indian school taken over by the State in 1909. No record was kept of the water or sewer lines. In 1941 there were 350 inmates and a building program was started to eliminate some of the old, dilapidated, wooden structures and replace them with others designed for a future capacity of 900, including employees.

The sewers were entirely too small and subject to clogging, and the untreated sewage was discharged into an irrigation ditch which discharged water and sewage into the Colorado river two miles from the institution. The original plans for improvement did not include sewers or a sewage treatment plant; however, these were included when the cost estimates were made by the author and were included in the project arranged for with W. P. A. All the engineering work, including supervision of construction, was done by the Division of Sanitary Engineering, State Health Department.

In building the main sewers, two layers of quicksand were encountered, resulting in the need of a lift station because of the difficulty of making deep trenches through the quicksand.

The sewage treatment plant, as described below, cost the institution approximately $3,807.

| PLANT: | |
|---|---|
| Rotary distributor | $ 672. |
| Pumps and fittings | 966. |
| Miscellaneous hardware and steel | 1,469. |
| | $3,107. |
| Gravel for concrete | 300. |
| Crushed rock for distributor | 400. |
| | $ 700. |
| Total | $3,807. |

This cost does not include labor or cement, both of which were furnished by the W. P. A.

The sewage treatment plant consists of a pump lift station, Imhoff tank, and trickling filter. The pump station consists of two — 150-g.p.m. non-clog, open shaft, raw sewage lift pumps with 4" suction and 3" discharge, capable of discharging against a 33 ft. head.

The Imhoff tank was designed for a 2-hour settling period based on the depth of only the vertical sides of the flowing-through chamber. The overflow rate is 275 gallons per day per square foot area. The sludge space provided is 3 cubic feet per capita. A 6-in. wall was constructed through the center of the Imhoff tank longitudinally, which divided the sludge chamber into

# fo Home for Mental Defectives

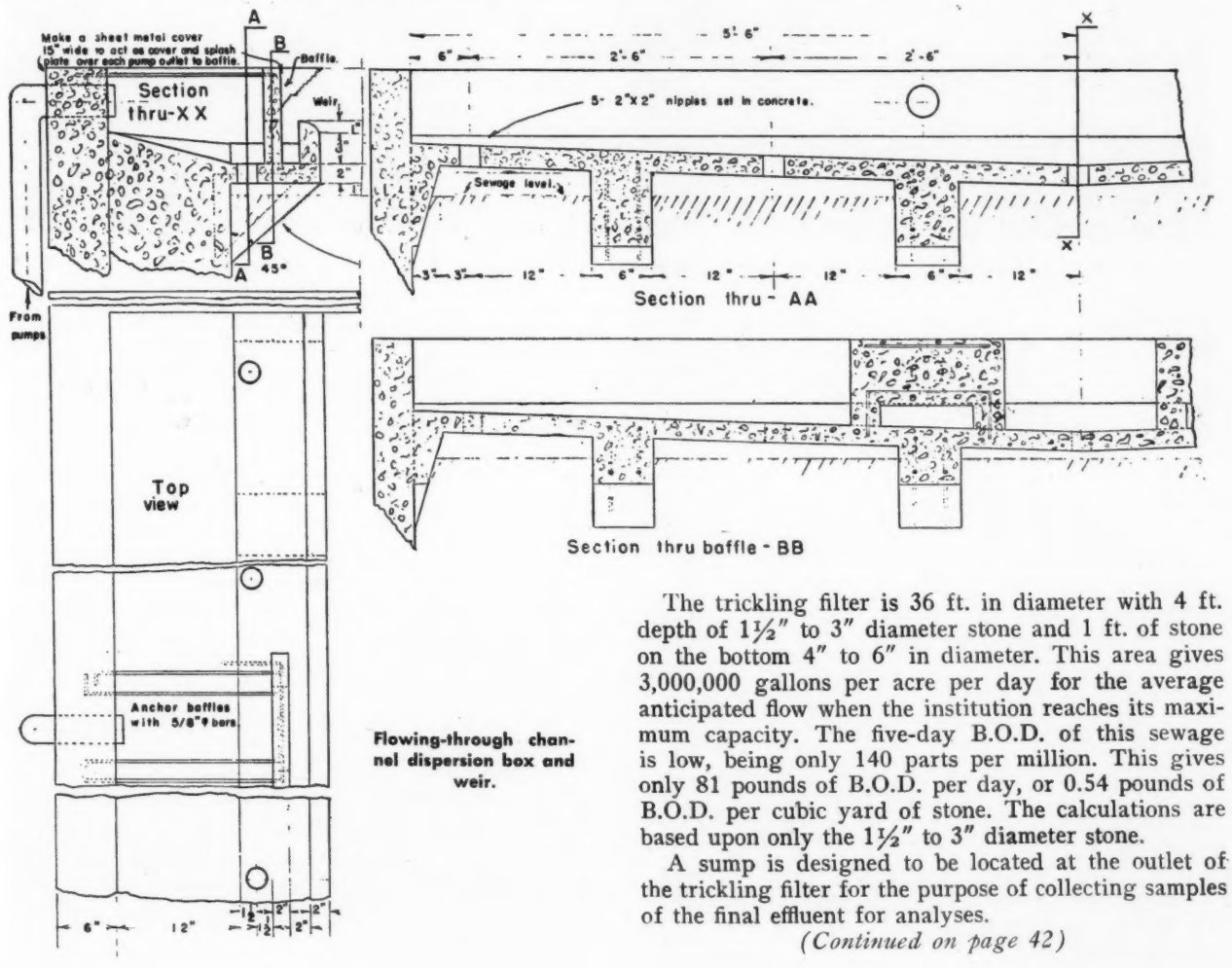
**Plant for 900 inmates, consisting of Imhoff tank and trickling filter, contains several small details, which are described and illustrated.**

two equal chambers. On the top of this wall is located a slot gate which lies below the bottom of the flowing-through chamber walls as shown on the sketch, Section GG, and the details of diverter panel. This slot gate was constructed of reinforced concrete in 8′ sections with a steel shaft through a location 2″ off center. The shaft rests on bearings, and since it is 2″ off center, only a pull of approximately 10 pounds is required to pull the gate from one side to the other. A steel rod is connected to a clevis, or a shackle, attached to the gate which is used to pull the gate from one side to the other. The purpose of this slot gate is to divert the settling solids into either one of the two halves of the sludge chamber, thus allowing the sludge in the other half to digest and then be discharged without drawing green or partially digested sludge to the drying beds. With this type of design it is necessary to have two sludge pipes which lead to the same valve chamber, where the sludge is discharged to the drying beds.

The location of the Imhoff tank is such that the bottom of the tank rests in two separate layers of quicksand; therefore it was necessary to furnish a foundation by driving piles to refusal and constructing upon these reinforced concrete beams, upon which the Imhoff tank was built, so that in reality the tank stands on stilts.

The inlet channel to the Imhoff tank consists of an over-flow weir over which the maximum flow will pass, also five — 2 in. holes, placed in the bottom of the inlet channel in such a way as to give equal distribution across the tank. These holes provide a method for handling the start and stop flow from the pump.

The dosing chamber is designed according to P.F.T. to discharge to a rotary distributor on the trickling filter.


Make a sheet metal cover 15" wide to act as cover and splash plate over each pump outlet to baffle.
Baffle.
Section thru-X X
Weir
From pumps
Top view
Anchor baffles with 5/8"ϕ bars.
5- 2"x 2" nipples set in concrete.
Sewage level
Section thru - AA
Section thru baffle - BB

**Flowing-through channel dispersion box and weir.**

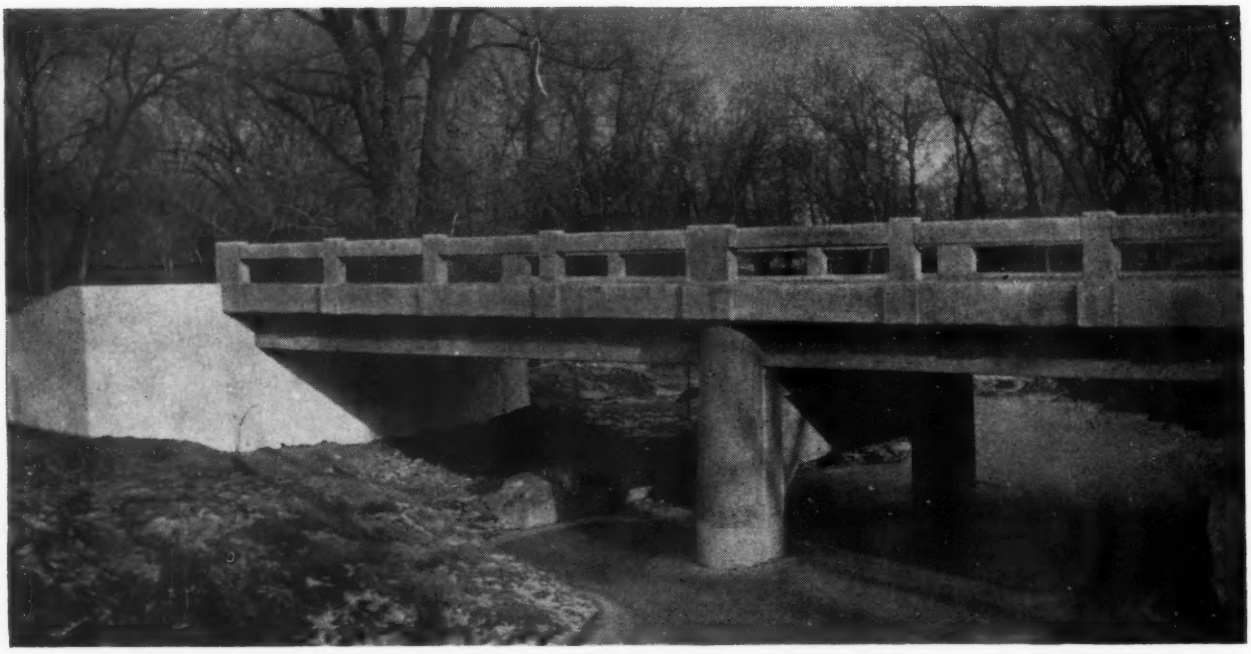
The trickling filter is 36 ft. in diameter with 4 ft. depth of 1½″ to 3″ diameter stone and 1 ft. of stone on the bottom 4″ to 6″ in diameter. This area gives 3,000,000 gallons per acre per day for the average anticipated flow when the institution reaches its maximum capacity. The five-day B.O.D. of this sewage is low, being only 140 parts per million. This gives only 81 pounds of B.O.D. per day, or 0.54 pounds of B.O.D. per cubic yard of stone. The calculations are based upon only the 1½″ to 3″ diameter stone.

A sump is designed to be located at the outlet of the trickling filter for the purpose of collecting samples of the final effluent for analyses.

*(Continued on page 42)*

# A Well Organized County Bridge

**Concrete bridges and culverts are replacing several hundred structures that no longer are adequate for the greatly increased traffic. The systematic program that is being followed is described in this article.**



**A 64-foot reinforced concrete T-beam bridge, with two 30 -foot clear spans. Note simplicity of lines for construction.**

GRAND Forks County, North Dakota, is a rectangle 36 by 45 miles in dimension, in which are four major streams and many coulees and drainage ditches tributary to them, bridging which requires several hundred structures on the county's main and secondary highways.

During the latter part of 1934 and 1935, soon after the writer became county engineer, a study was made of the bridge situation in this county and the results were appalling. It was found that, of more than 600 drainage structures in this county located on the rivers and streams, coulees and ditches, and ranging from box culverts to multiple-span bridges, approximately 75% were unfit for public travel due to obsolescence, inadequate design, faulty construction, deterioration, or lack of maintenance. A great majority of these bridges had been made inadequate by the tremendous increase in travel requirements since they were constructed. It was found that very little thought had been given to bridge location, alignment, sight distances, roadway, and load-carrying capacity; and that much of the construction was poor, chiefly due to the quality of materials used and evident lack of foundation studies, this being especially true of the concrete work.

While local gravel has proven satisfactory for road surfacing, there are few, if any, pits in this county suitable for concrete usage without washing and grading, and many bridges had been constructed using local materials which had a high percentage of organic matter, slate, shale, dirt, and other qualities undesirable for concrete work. Improper concrete proportioning also was evident. Concrete structures made of these materials have peeled and disintegrated to such an extent that public travel was made unsafe. Bridges were constructed across streams at the narrowest points, regardless of road and bridge alignment. Very few of the bridges constructed had capacities exceeding 10 tons, which at the present time is inadequate.

The problem of modernizing these structures was one that appeared to be almost insurmountable, but finally a project was worked out to undertake the reconstruction of these bridges on the basis of a long range program, in which the W.P.A. agreed to cooperate to the fullest extent, and much credit for the success achieved must go to that organization and its local management. They furnished the necessary labor together with whatever material they could make available, and the county furnished other necessary material and equipment.

# dgodernization Program

By J. W. HARTY
County Engineer, Grand Forks County, N. D.

J. W. Harty

To obtain the most satisfactory results, a definite and well organized plan was necessary, and the following system has been employed:

Field investigations are made by this office to obtain all information necessary for the construction of the bridge, including proper location for highway alignment; necessary channel revision, if any; determination of drainage area; water level; ice conditions; bank erosion; examination of existing structures in the vicinity of the proposed bridge; character of the stream, and its channel; soil studies; and determination of safe bearing loads.

It was decided that reinforced concrete construction was the most adaptable to this type of project, would be most economical for the county, and would require materials most easily obtainable by both the W.P.A. and the county. Standards of bridge and culvert construction were established with this in view. The standard bridge practice is to use reinforced concrete T-beam and slab spans adaptable to single and multiple spans with only slight modification of forms. Standards for secondary roads provide a 15H loading with not less than 22-foot clear roadway; and for primary roads a 20H loading with not less than 24-foot clear roadway. Deficiencies in alignments have been corrected in many cases, necessitating channel changes.

We also have followed the policy of properly treating the lumber for all forms before their use and have found that our saving in material has more than offset the time and expense of this oil preparation. Forms are built in sections, easily disassembled.

We have attempted to construct the bridges progressively. Plans are always ready for at least one bridge in advance, so that the foreman in charge of construction can organize his crews for the most efficient work. One crew is designated for preliminary excavation and pile driving. Immediately upon the completion of this work, the carpenters, who have been constructing and making the necessary revisions in forms, are ready to erect these forms, while the excavation and pile-driving crew moves to the next bridge. Likewise, steel men are preparing the steel for the bridge ahead so that, as needed, it is ready for installation; and so on throughout the complete construction. This method has materially speeded the construction and has kept, so far as possible, each man doing his own type of work all the time and thus he has steadily become more proficient in it.

Double box culvert, typical of new construction.

County trucks are used for bringing gravel and sand from one of the two pits in the county having facilities for washing and grading stone and sand aggregates. (Only washed and graded materials are used in the bridge construction.) Proportioning of materials is determined by the type of concrete and by the moisture content of the material to be used. All materials are secured locally as nearly as possible and this has reacted most favorably with the merchants of the county. All designs have been simplified as to forms, yet retaining a certain degree of symmetry, in order to make the work less difficult to handle. Forms for exposed surfaces, such as guard rails, are lined to provide smoothly finished surfaces.

Bridge which failed during 1941 flood, when abutment slid into the river.

The comparatively short construction season in this territory makes it necessary to organize the crew for proper handling and placement of the concrete during the most severe kind of weather. Under such conditions, the structure is enclosed, the aggregate properly heated, and the concrete, when placed, is kept at the proper temperature during a suitable curing period. No chemicals are used to speed up the curing period. Using this procedure, we have been able to produce as satisfactory structures during the winter months as can be obtained during the more desirable construction periods of the year. As evidence of the success of the procedures, none of the structures con-

**Bad alignment of old bridge, making a 45° skew in the road.**

structed to date have required any maintenance since completion.

Progress undoubtedly has been slower than by the contract method, due to the working hour requirements, but we not only have furnished employment for many men, but also have constructed worth-while public works of decided benefit to the taxpayers. Moreover the work has given the men an opportunity to become proficient in many phases of bridge construction.

Since the inception of this project, we have completed the construction of 161 drainage structures, ranging from 3′ x 3′ box culverts to multiple-span reinforced concrete T-beam bridges. The county and

**Timber bridge which failed in 1941, temporarily repaired for light traffic. Note stone abutment laid up without mortar.**

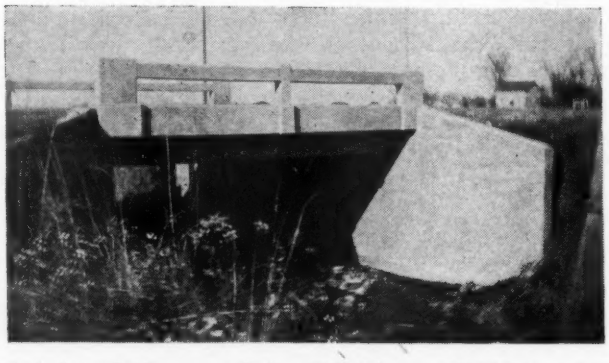
the W.P.A. have on the project sufficient equipment, including mixers, pile driver, trucks, tools, pumps and hoisting machines, to carry on further work in an efficient manner. Based on conservative construction costs, the procedure followed on these 161 structures has resulted in savings to the county of Grand Forks in excess of $75,000. This saving, together with the fact that approximately one-third of our obsolete structures have been replaced, is a record of which the W.P.A. and the county are justly proud.

In the spring of 1941, the northern half of this county experienced very severe flood conditions. The storm of March 14th, one of the most serious in the history of North Dakota, packed bridges, culverts, ditches, drains, rivers and streams so solidly with snow that the spring break up, which was accompanied by heavy rains, caused serious flood conditions resulting in the destruction of 27 bridges, and partial damage to 30 other structures. This necessarily caused us to revise our schedule of construction completely for 1941 and to turn to the immediate task of placing the damaged bridges in condition for travel, and by the beginning of 1942, the majority of these bridges had been replaced with new structures, where required, and the balance had been sufficiently repaired to allow travel with certain restrictions. This repair and reconstruction work was done under the W.P.A. project.

Many of the bridges destroyed in this flood were timber bridges on drainage ditches. This county is over-run with a network of drainage ditches which have been allowed to fill in during the dry years and over which many inadequate and poorly constructed timber bridges were built. As rapidly as funds will permit, the county will continue to replace obsolete structures with modern structures meeting present traffic requirements, anticipating future requirements, and having in mind the elimination of as much of the maintenance cost as is possible. As mentioned before, lack of maintenance has been one of the contributing factors to the bridge situation in this county.

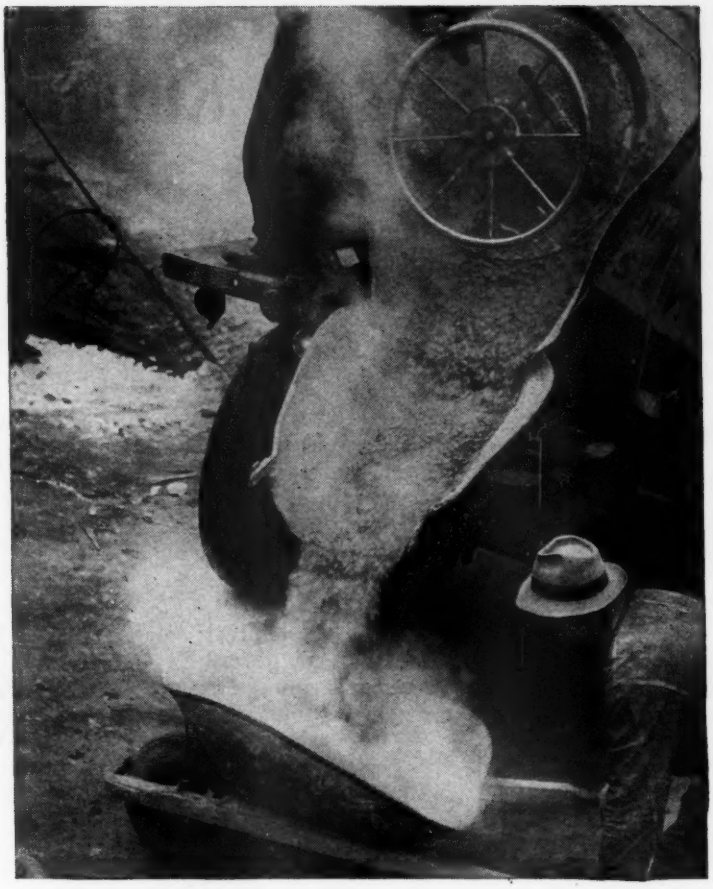
A card file system, which is a modified copy of a form used by Mercer County, N. J., (see PUBLIC WORKS, Dec., 1941), has been adopted for use in this county as furnishing the Engineer's Office with

*(Continued on page 41)*



**Typical new bridge across ditch, a 22-ft. T-beam with 24-foot roadway. Note similarity in form work to larger bridges.**

# MAKE IT HOT FOR THE AXIS!



## DON'T LET WINTER SLOW DOWN VITAL WAR PROJECTS

A CRITICAL WAR WINTER is ahead of us. No time, this, to let cold weather slow down vital construction. Keep jobs on schedule, even in sub-freezing weather . . . use 'Incor' 24-Hour Cement . . . save time, money, worry.

Help make it hot for the Axis by speeding war construction. Heat mixing water and aggregates . . . protect the concrete promptly after placing. 'Incor' utilizes heat protection three times as effectively, because it hardens in one-third the usual time, cutting heating costs in direct proportion to the time saving.

Fifteen years' performance shows that 'Incor'* pays its way in heat and labor savings alone. High speed schedules . . . 50% to 60% less forms. Geared to the needs of wartime construction.

*Reg. U.S. Pat. Off.

## LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS . . 15 MODERN MILLS . . 25-MILLION BARRELS ANNUAL CAPACITY

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

# Humus from Rubbish and Sludge

**English experiments with screened and demineralized refuse mixed with primary sludge as an activator and allowed to mature, forming a fertilizer and soil conditioner.**

WITH the conservation urge stimulated by war conditions as a weighty inducement, some engineers in England have developed and are advocating a method of utilizing domestic refuse and sewage sludge to create humus, thus not only providing an aid to growing food at home but also saving the cost and labor required for building sludge disposal plants. The process was advocated by Lieut.-Col. F. C. Temple in a paper read before the Royal Society of Arts in London, of which the following is an abstract.

Col. Temple referred to work done along this line by Sir Albert Howard and others in India. Howard has said that the utilization of vegetable and animal wastes in crop production involved two definite steps: (1) the formation of humus and its incorporation in the soil, and (2) the slow oxidation of that product accompanied by the production of available nitrogen. Both stages were brought about by micro-organisms for which suitable environment conditions were essential. The requirements of the first stage were so intense that, if the process took place in the soil itself, it was certain to interfere with the development of the crop. In fact, said Colonel Temple, the soil suffered from indigestion. That explained to a large extent why crude sewage, crude refuse, and some of the sewage and refuse derivatives had been found wanting, or even harmful, by cultivators. It was clear that in many places the first phase had not been sufficiently prolonged to allow the second to come into operation before the stuff was offered to the crop.

Having referred to the formation at Maidenhead and Leatherhead of composts, with sedimentation sludge as the activator, which had achieved remarkably good results, he said the most striking features about the process of composting were its simplicity and flexibility. The refuse was screened, picked for large paper, rags, boots and bottles, passed under a magnetic separator for the extraction of tins and iron, and pulverized. The pulverized residue was stacked in heaps some 100-200 sq. ft. in area, to a depth of 1 ft. 6 in. to 2 ft., and a rim of refuse built up round the edge another 1 ft. or so. Then sludge from simple sewage sedimentation tanks was run into the saucer so formed, usually three times at about twelve-hour intervals. Two days later the heap was turned; it was turned again after four days more, and again after a further four days, and still four days later it was taken to the stock heap, where it matured if the farmers had not already taken it away to mature on resting ground. Some of the saucer-shaped stacks were made on old concrete floors; but it was said that they did just as well and possibly better on beaten earth. At Leatherhead they were not roofed, but the heat of fermentation was such that it was more difficult to keep them moist enough than to keep them dry.

Comparisons of the percentages of sewage sludge to refuse in different places had proved extraordinarily difficult. The percentage of moisture in the sludge being so variable, the dry matter was the comparable basis for argument. But the information published regarding the average quantity of dry matter produced per head per day varied from Clemesha's figure of 0.16 lb. to Buswell's 0.08 lb. In sewage works it had been estimated variously from 0.1 lb. to 0.07 lb. per head per day. Not only was there a wide discrepancy in those figures, however, but the proportions of refuse to night-soil actually composted together in four different centres in Indore varied from 10 per cent to 64 per cent without apparently breaking the process down. Messrs. Jackson and Wad had said that no proportioning was necessary, and that whatever quantities of refuse or night-soil arrived must be treated at once, no excess of either being left over,. That practice appeared to be followed at Leatherhead, the whole of the refuse that came to hand being composted with whatever sludge was "on tap." There must be limits, said Colonel Temple, to the proportions of sewage sludge and refuse which could be composted successfully together; but they were evidently very elastic. It was probable that an ideal condition might be realized in which the whole of the refuse and the whole of the sewage sludge of any community could be mixed together to react on one another with the help of micro-organisms, and so complete the life and death cycle to nourish new life.

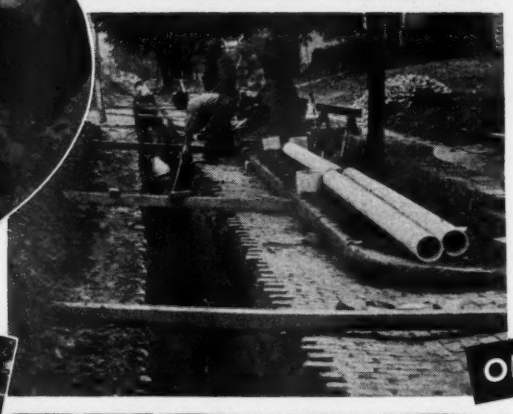
It was not to be expected that the process would be adopted widely with great rapidity, because that would involve the abandonment of much that had been done at great cost. Moreover, it involved close co-operation between two departments, sewage disposal and public cleansing, which at present often had no connection with one another. But both were liable to have difficulty in finding places in which to throw away their final residue; the composing process removed that difficulty entirely from the sewage disposal department and reduced the final residue of refuse to such small dimensions as to give little or no trouble. It was obvious that the tendency would be to establish fertilizer factories at sewage works rather than at refuse dumps or destructors, for it would usually be simpler and cheaper to divert the refuse to the sewage works than to pump the sludge to the refuse works. At most sewage works there would be ample space, now used for drying or dumping sludge.

As pointed out by Sir Albert Howard, the value of the compost must not be judged on comparison by chemical analysis with artificial fertilizers but by results, for the nitrogen in organic humus might be worth three times the same weight of nitrogen in artificial fertilizer.

# Trend...

NEW YORK

NEW JERSEY

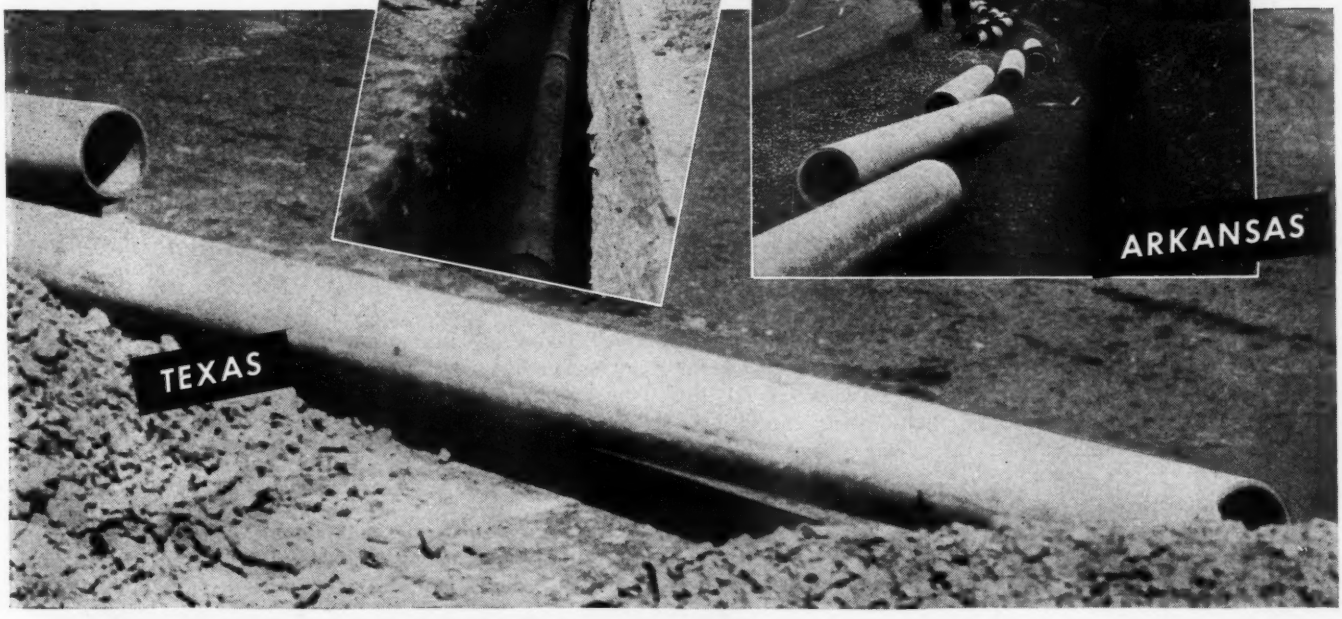


OHIO

**FOR DETAILS on Transite Pressure Pipe, write for brochure TR-11A. Information on Transite Sewer Pipe for lower cost sewage-disposal systems is available on request—brochure TR-21A. Johns-Manville, 22 East 40th Street, New York, N. Y.**

MASSACHUSETTS

ARKANSAS



TEXAS

## JOHNS-MANVILLE

JOHNS MANVILLE JM PRODUCTS

# Transite Pipe

*AN ASBESTOS PRODUCT*

FOR EFFICIENT, ECONOMICAL WATER AND SEWER LINES

*When writing, we will appreciate your mentioning* PUBLIC WORKS

# Preference Rating Procedure Up-to-Date

**A clear and concise explanation of the procedure to be employed in utilizing preference ratings.**

UNDER date of November 30th, T. T. Quigley, of the Priorities Dept. of Wallace & Tiernan Co., prepared such a clear and concise explanation of the procedure to be employed by officials of water works and other utilities in utilizing preference ratings, with the latest amendments, that we think it should be brought to the attention of all officials of public utilities. Accordingly we are reproducing it on this page. The explanation is as follows:

Preference Rating Order P-46 was recently amended granting utilities higher ratings. Under the terms of the Order a "producer" (a person entitled to use the rating) is any person or organization located in the United States (including territories and possessions), engaged in (or constructing facilities for the purpose of engaging in) the supplying of electric power, gas, *water,* steam, or public sanitation for general use by the public.

In the United States a producer may assign the authorized ratings to all purchases of material for maintenance, repair and operating supplies without any special permission from the War Production Board, provided he also complies with the other requirements outlined in the Order. In the Dominion of Canada, however, the ratings may only be used by a producer after he has applied to the War Production Board and has a copy of the Order issued in his name.

"Material," for the purpose of this Order, means any commodity, equipment, accessory, part, assembly or product of any kind.

"Maintenance" means the *upkeep* of your property and equipment in sound working condition.

"Repair" means the *restoration* of property and equipment to sound working condition, after wear and tear, damage or destruction has made it unfit or unsafe for service.

"Operating Supplies" means *any material* which is essential to the operation of your plant *and* which is generally carried in inventory and charged to operating expense accounts. "Operating Supplies" *also* means *minor capital expenditures* such as material for an addition to, or an expansion of property or equipment (but not an extension to a consumer's premises), provided that the cost of *material* for any such expansion or addition does not exceed $1,500 for underground construction and $500 for other construction. In no case may a single construction project be subdivided into parts in order to come below these limits.

There are two preference ratings assigned by the Order:

AA-5 for *ordinary* deliveries of material required for maintenance, repair or operating supplies; and

AA-2X for *emergency* deliveries of material required for the repair of an actual breakdown or to make reasonable advance provision for such repair.

The AA-2X rating may, however, be applied to only 30% of the total amount of material *in any one class* which you are allowed to order under the inventory limitations.

We would like to point out particularly that the new ratings of AA-5 and AA-2X are vastly different from the old A-2 and A-5 ratings, so be sure to include both A's.

The ratings may be assigned by either of the following methods and it is immaterial which method you use:

1. By placing the appropriate rating opposite the item on your purchase order and then endorsing on the purchase order this certification:

"CERTIFICATION

The undersigned purchaser hereby represents to the seller and to the War Production Board that he is entitled to apply or extend the preference ratings indicated opposite the items shown on this purchase order, and that such application or extension is in accordance with Priorities Regulation No. 3 as amended, with the terms of which the undersigned is familiar.

(*Your company name*) _____

(*Name of purchaser*) _____ (*Address*)

By _____

(*Signature and Title of Duly Authorized Officer*) _____ (*Date*)

or 2. The rating may also be applied by endorsing the following statement on the purchase order:

"Rating.....*, material to be delivered pursuant to Paragraph (b).....** of Preference Rating Order P-46, Utilities: Maintenance, Repair and Supplies, with the terms of which I am familiar.

(*Your company name*) _____"

(*Name of Producer or Supplier*) _____ (*Signature of Designated Official*)

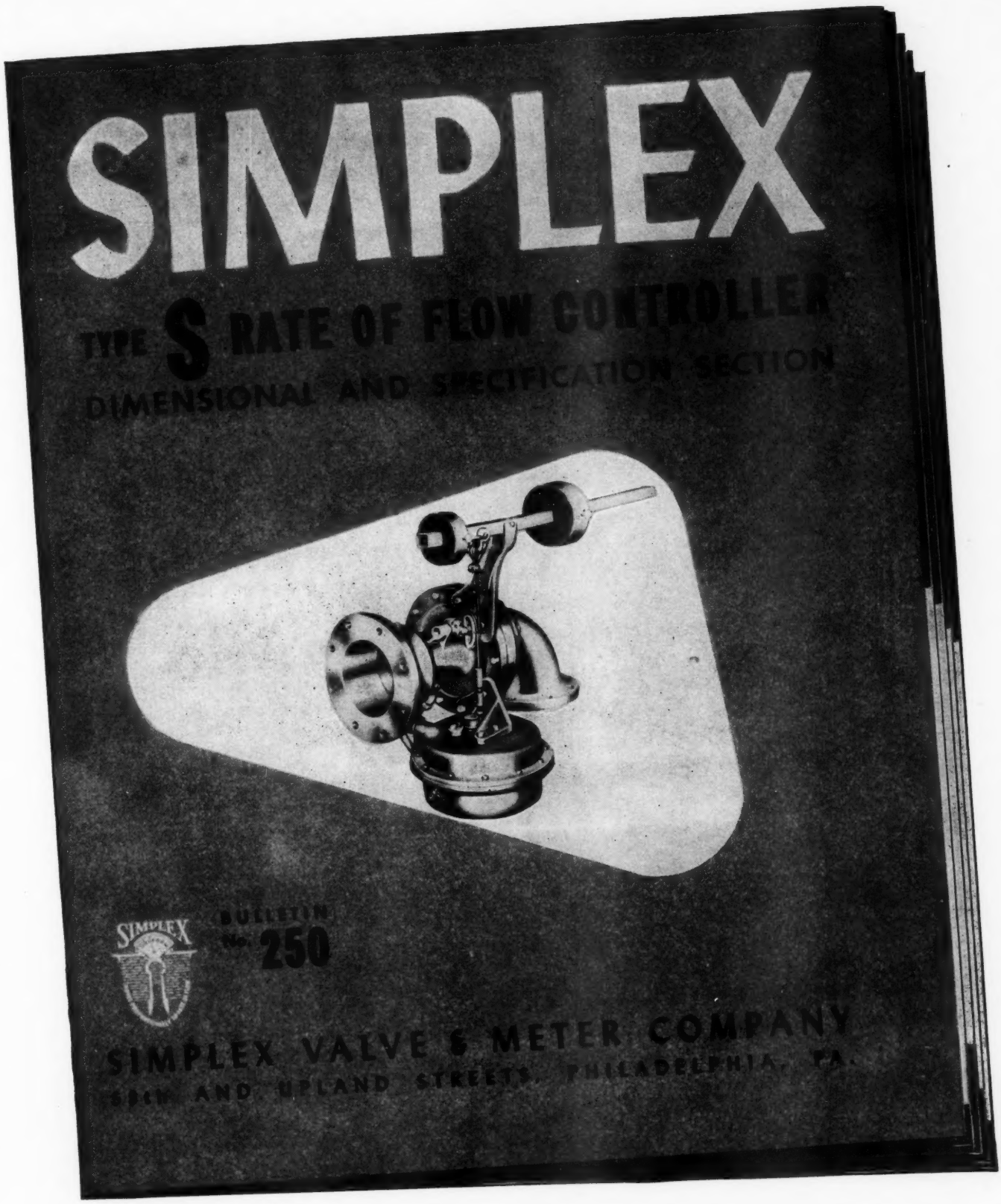
* Fill in AA-5 or AA-2X as outlined above.
**Fill in (1) (i) for AA-5 or (1) (iv) for AA-2X.

All material purchased, or used from inventory, is governed by inventory restrictions and limitations, the details of which may be obtained by consulting the text of the Order.

In addition to the use of the ratings for maintenance, repair and operating supplies, the AA-5 rating may also be used to purchase capital equipment exceeding $1,500 underground and $500 above ground for protection against sabotage, air raids, etc. if specific permission is first obtained from the War Production Board. The text of the Order should be consulted for details on these special uses.

P-46 will thus cover all your needs for maintenance, repair and operating supplies as well as some capital equipment. However, if you need capital equipment which you are unable to purchase under P-46 for any reason, you should make application for a rating on a Form PD-1A (copies of which will be sent on request), to the Water Production Section of the Power Branch, War Production Board, Washington, D. C. This application must be specific and definite in all details because unless complete information is given regarding the actual need for the equipment.

*(Continued on page 45)*




***In response to demands for plain facts . .*** **Simplex Bulletin 250 puts at your finger tips detailed dimensional data necessary for design & specification purposes.**

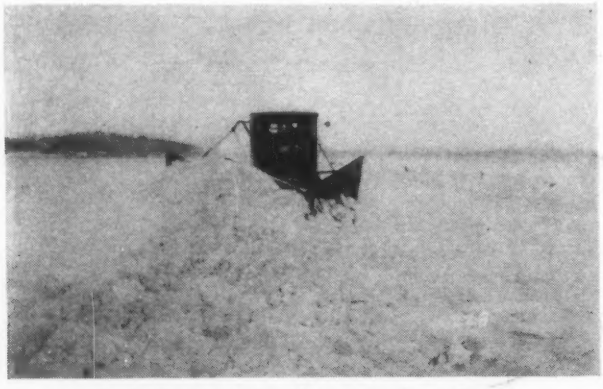
*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

# How Our Airports Are Handling the Snow Problem

**Results of a special survey by PUBLIC WORKS Magazine to determine current methods of handling snow on municipal airports.**

HANDLING snow on an airport has many points of similarity to handling it on highways, also points of dissimilarity. If a highway department in the northern snow belt can keep on its main highways, an open traffic channel 30 ft. wide with almost vertical walls 5 ft. or more high, they feel that they have done a good job. But on an airport, runways—generally several miles of them—must be kept in usable condition for a width of 150 ft., with the banks at the sides sloped back on about a flat grade to permit the wings of planes to overhang the edge of the roadway should they run too close to it.

Six inches of snow pushed to the side from half of a 150-ft. roadway, compressed 50% by plowing, would give a sloping bank about 20 ft. wide by 2 ft. high at its outer edge. If blade plowing is relied on, the first snow should be pushed back 85 to 100 ft. from the center of the roadway and given the proper slope with the wing blade.



**Frink Plow removing deep snow from airport.**

In some airports where snow falls are deep and frequent this would be very difficult, and a number of these pack the snow down in the runway and keep it level. This, however, seems to be impracticable where occasional thaws would soften the snow so that the planes' skids or wheels might sink in in spots.

Where the amount of snow to be handled warrants it, an excellent plan is to use two types of plows; a light one-way plow with a fast truck starts at the middle of the road and throws the snow toward the edge by several runs. When the accumulation becomes too deep for this, a heavy truck with a V-plow—preferably an offset V—and wing pushes it the rest of the way and cuts it to the desired slope.

Instead of plowing the snow all the way, many prefer to plow it into windrows, then pick up the windrow with a rotary plow and throw it far beyond the runway. This is probably the best plan, where the purchase of the extra equipment is practicable. In the case of a high wind, all the snow must be thrown to the leeward side of the runway. A device recently introduced is a combination blade and rotary, the rotary being at the rear end of the blade, which feeds the snow to it. Some of these can, it is claimed, remove an 8 ft. swath travelling 20 miles an hour.

In the case of deep snows, plows will find difficulty in handling the snow at runway intersections, where that from both runways would be pushed. Perhaps the best plan for these is to haul the snow away by trucks, using snow loaders. Some fields use snow loaders and trucks for removing windrows piled by plows.

Compacting the snow is generally performed with rollers, while drags (preferably hauled by crawler-type tractors) are used for leveling the surface. In Canada the standard method is to roll successive snowfalls until a bed of 4 to 6 inches of well packed snow has been formed. This generally packs and freezes until it is practically ice. The rollers used are various, often home-made of wood or corrugated steel pipe, or even large vitrified pipe. Corrugated pipe seems to pack the snow better than a flat surface. Pontiac, Michigan, uses a wooden roller made from cable reels, as well as steel ones.

Where the aim is to keep the runways, taxiways, walks etc. clear of ice, calcium chloride or salt is used by a number of airports, while others forbid its use. It seems that, while Army air bases and the Civil Aeronautics Authority use these chemicals, commercial air lines do not, claiming that they are thrown or splashed onto the metal work of the planes and cause corrosion.

The managers, superintendents, directors etc. of a number of airports have furnished us with descriptions of their practices, from which we glean the following information.

**Sno Go MLU operating on the Albany Airport.**

The Bangor, Maine, Army base uses V-plows with wings and about eight one-way blade plows traveling in echelon; starts plowing as soon as there is 1½ in. of snow and continues until the storm is over, when the shoulders are trimmed back, corners cleaned, etc. After plowing, big bombers run up and down the runways a few times leave the runways practically clean. If ice should form, they use treated sand, or calcium chloride or salt.

Augusta, Me., with 555,500 sq. yd. of runways, using 3 men who are regular employees, uses a FWD truck and a smaller one rented on an hourly basis. Hopes to get a rotary.

Westfield, Mass., 370,000 sq. yd. of runway, borrows plows from the city Public Works Dept. and rents trucks. Needs a truck with blade and a rotary.

Detroit, Mich., 45,000 sq. yd. of runway, uses its 10 regular employees, a "Sno Go" rotary, and "Federal" and "International" trucks with flanges.

Lansing, Mich., 20,000 sq. yd. of runway, uses its 4 regular employees, with Caterpillar and Fordson tractors.

The Chicago municipal airport, 500,000 sq. yd. of runways, uses its 26 regular employees, with 3 trucks with Baker plows and one F.W.D. with roto-blade attachment.

Billings, Mont., 550,000 sq. yd. of runways, uses its 2 regular employees and a diesel Caterpillar patrol pulling drags and rollers to pack the snow. Needs a smaller caterpillar.

At Great Falls, Mont., 150,000 sq. yd. of runway, the Street Department handles the snow, using Caterpillar and Allis Chalmers patrols. Needs a rotary.

Boulder, Colo., 300,222 sq. yd. of runways, uses its 4 regular employees; will use its regular road graders.

Minneapolis municipal airport, 330,000 sq. yd. of runways, uses its 4 regular employees, with a Snow King rotary, an F.W.D. truck and a 1½ ton truck with speed blade.

St. Paul, Minn., 460,000 sq. yd. of runways, uses its 6 regular employees, and a 35 hp. Case tractor, a 35 hp Cletrac, a 12 ft. corrugated snow roller, a 20 ft. corrugated snow roller, and rails and I-beams for cutting down drifts. Needs a rotary.

Des Moines municipal airport, 300,000 sq. yd., uses its 4 regular employees, with a "Sno Go" rotary. Needs also a 3 to 4-ton truck with a 1-way plow.

North Platte, Neb., with 4 miles of 100 ft. runways, uses 4 men from the city street department, a Caterpillar and an auto patrol.

Kansas City, Mo., 8,000 sq. yd. of runways, clears only the landing ramp, this being done by the street cleaning department using tractors with street brushes and trucks with blades.

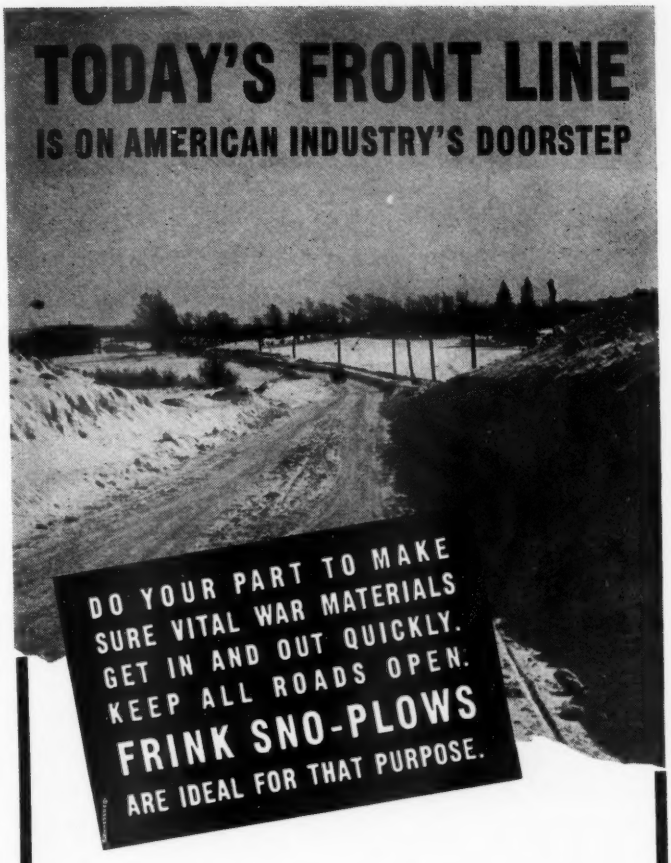
St. Louis, Mo., 1,500 sq. yd. of runways, uses its 10 regular employees with a grader, tractor, trucks, fire hose, brooms and shovels.

Dayton, O., 32,000 sq. yd. of runways, with 4 regular employees, uses airport tractors with a "snow plow arrangement of our own design."

Rochester, N. Y., 250,000 sq. yd. of runways is cleared by the Dept. of Public Works using 40 men, a Sno Go, 3 Barber-Greene snow loaders, 3 Walters "Snow-fighters", 5 trucks with plows and 18 dump trucks. Needs another Sno Go.

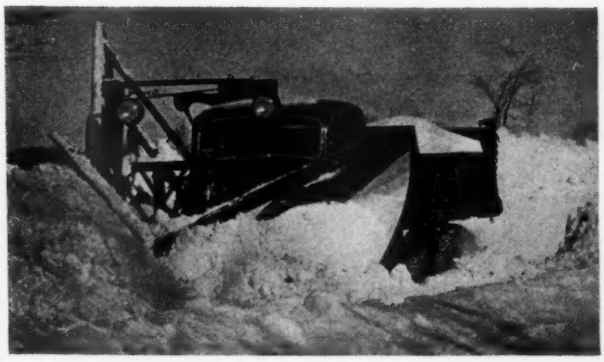
The Washington, D. C. National airport, 2,662,000 sq. yd. of runways, uses approximately 15 regular employees, with 2 GMC trucks and Wausau plows, and 2 Case tractors with Good Roads plows. Needs a Sno Go.

*(Continued on page 39)*



TODAY'S FRONT LINE
IS ON AMERICAN INDUSTRY'S DOORSTEP
DO YOUR PART TO MAKE SURE VITAL WAR MATERIALS GET IN AND OUT QUICKLY. KEEP ALL ROADS OPEN.
FRINK SNO-PLOWS
ARE IDEAL FOR THAT PURPOSE.

**Whether your problem is one of airports or highways — or both — there's a Frink Sno-Plow for every need, equipped with every modern device for fast, clean plowing; plus numerous *exclusive* Frink features.**

**NOW is the time to post yourself on the latest improvements and many advantages of Frink equipment.**



***Write for your copy of our catalog today.***

CARL H. FRINK, Mfr., CLAYTON, 1000 Isl., N. Y.
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS OF CAN. Ltd., TORONTO, ONT.

*When writing, we will appreciate your mentioning* PUBLIC WORKS

# Well Worded State Highway Specifications

**In looking over the specifications of a number of State Highway Departments we have noted from time to time certain items that seemed to us unusually well worded or possessing other noteworthy features. Thinking they may be of interest or service to many highway engineers, we are quoting some of them herewith and shall probably present others in a later issue.**

### Fills Measured in Embankment

*Description.*—This item shall consist of excavating or pumping and placing fills, in a satisfactory manner, strictly to the required alignment, grade and typical cross section shown in the plans.

*Method of Measurement.*—The yardage of fill to be paid for shall be the yardage of material measured in place in the embankment, by the method of average end areas of the material actually in place, except that no allowance or payment will be made for any surplus materials outside the lines of the typical cross section. No allowance will be made for stripping or the preparation of borrow pits for excavating or pumping of materials.

*Basis of Payment.*—This item shall be paid for at the contract unit price per cubic yard for "Fills Measured in Embankment", measured as provided herein, which price shall be full compensation for all excavation or pumping, for the transportation of the material from the borrow pit or borrow pits to the fills, for the formation and compaction of the fills, for the disposal of all surplus materials, for the preparation of the subgrade and for the furnishing of all equipment, tools, labor, and incidentals necessary to complete the work. No payment will be made for overhaul. No payment will be made for materials placed outside of the neat lines of the typical cross sections as shown in the plans. *Nebraska Department of Roads and Irrigation.*

### Disposal of Surplus Material

*Construction Methods.* — All surplus excavated and waste material shall be used to widen embankments or flatten slopes uniformly or shall be deposited in such other places and in such manner as the Engineer may direct. Waste material or stripping shall be placed back into the borrow pits when required, after final measurements have been taken.

*Method of Measurement and Basis of Payment.*—This work will not be paid for directly but shall be considered as subsidiary work pertaining to "Excavation". *Nebraska Department of Roads and Irrigation.*

### Tree Wells and Tree Root Protection

*Description.*—This item shall consist of the protection of selected trees, shrubs, or other woody plants by tree wells so constructed as to protect the root system. It shall also include the placing of porous material, mulch, or other approved material to such depth around the roots as may be directed. Tree wells shall be constructed of Portland Cement Concrete, rubble Masonry, or other Masonry as may be indicated on the plans. Such construction shall be performed in accordance with the design and details indicated on the plans.

*Tree Wells.*—The materials used in the construction of the tree wells shall conform to the requirements set out elsewhere in the Specifications or as shown on the plans.

*Tree Root Protection.*—The material for root protection shall be aggregate of approved quality, ranging from ⅜ to five inches in size. The material may be any suitable aggregate taken from the roadway excavation, broken to suitable size, or may be gravel, crushed stone or slag.

*Construction Methods.*—All excavation incidental to and necessary for constructing tree wells or for tree root protection shall be so conducted as to avoid injuring the root system. Adequate drainage of the wells shall be provided by means of weep holes, drain tile, etc., as may be indicated on the plans. Tree wells shall be constructed in accordance with the dimensions and arrangement shown on the plans or as directed by the Engineer. They shall be made of masonry as shown on the plans or directed by the Engineer, provided, however, that dry rubble masonry, only, shall be used in any portion of the tree well extending below the level of the top of the contiguous broken stone root protection. No backfill of any nature shall be placed by the contractor above the root spread of a tree or plant which it is desired to preserve until a fill of porous material not less than 3 inches in depth or as directed by the Engineer has first been placed above its roots.

Where tree root protection is ordered the porous material shall be placed to a depth ranging from 3 to 12 inches (or to such other depths indicated on the plans) over the root spread of the tree or trees selected, about each of which a tree well is to be constructed, or other trees within or without the fill area, not to be welled but indicated for tree root protection by the Engineer.

The area for tree root protection shall be first thoroughly cleaned of all vegetation and porous material shall be then spread loosely over the required area.

Following the spreading of the porous material for tree root protection a minimum of from 4 to 5 inches of topsoil shall be spread above the porous fill to bring the area to the finished-grade lines designated by the Engineer. Such topsoil shall be transported, handled, and paid for as specified elsewhere, or as directed in writing by the Engineer.

Sufficient care shall be taken so that trees or shrubs which are to be preserved in place are not scarred or damaged by the operations under this item. The root area to be protected shall be the area of ground surface lying within the periphery of the tree.

*Method of Measurement.*—The yardage of masonry to be paid for shall be the number of cubic yards of masonry measured complete in place and accepted. No measurement will be made for excavation, as this work shall be considered as subsidiary to the construction of the masonry or tree root protection. The yardage of tree root protection to be paid for shall be the number of cubic yards of stone, gravel or slag placed in tree root protection, measured in vehicle at point of delivery, and accepted.

*Basis of Payment.*—The yardage of masonry, determined as provided above, shall be paid for at the contract unit price per cubic yard bid for Tree Well Masonry. The yardage of porous material tree root protection, measured as provided above, shall be paid for at the contract unit price per cubic yard for "Material for Tree Root Protection", which price and payment shall be full compensation for excavating and cleaning the ground surface, for placing the porous fill, procuring and delivering all materials and for all labor, equipment, tools and incidentals necessary to complete the job. *Alabama State Highway Department.*

### Name Plates on Bridges

*Description.*—This item shall consist of furnishing and placing name plates as called for on the Plans.

*Materials.*—The plates shall be of cast bronze, cast aluminum or other material, as specified on the Plans or in the Special Provisions or Proposal. The material used shall be first class in every respect.

*Size.*—The dimensions of the plates shall be as specified on the Plans, or if not specified, shall be as determined by the Engineer. The thickness of metal shall be sufficient to give the necessary strength and durability.

*Placing.*—The plates shall be placed as shown on the Plans and properly anchored.

*Embossing.*—There shall be embossed on the face of the plate suitable neat ornamentation, a description of the structure, and the names of the persons officially concerned with it as furnished by the Engineer on request. The embossed portion including a border shall be polished, other portions being stippled. A full size drawing or preferably a contact print of the plate shall be submitted to the Engineer for approval before casting.

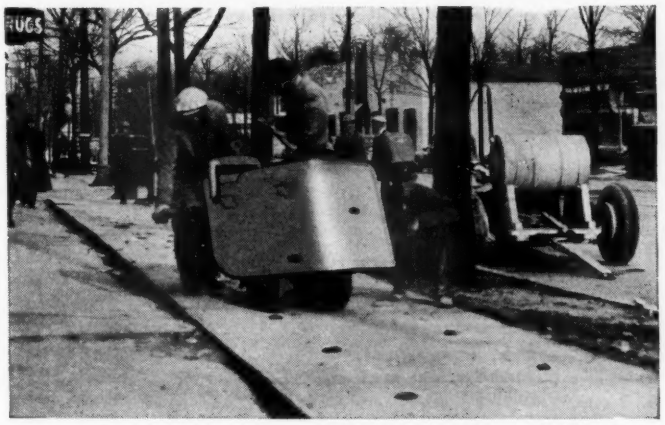
*Basis of Payment.*—This item shall be paid for in place, completed and accepted, at the lump sum price bid for, which price and payment shall constitute full compensation for designing, furnishing, preparing and placing all materials and for all labor, equipment, tools and incidentals necessary to complete this item.—*Adapted from Ohio Department of Highways.*

## How Airports Handle Snow

*(Continued from page 34)*

Los Angeles, Oakland and San Diego, Calif., report no snow to be handled, due to "our glorious California climate."

Asked concerning their use of chemicals for ice control, use of salt was reported by Chicago, Augusta and Bangor, Me., Kansas City and St. Louis, Mo., and Billings, Mont. Calcium chloride is used by Bangor, Washington, and Dayton. Neither is ever used by Des Moines, Westfield, Mass., Detroit or Lansing, Mich., Minneapolis or St. Paul, Minn. Great Falls, Mont., and North Platte, Neb., never have ice.



**CUT MAINTENANCE COSTS 75%**

**Concrete slab maintenance costs can be reduced as much as 75% by the Koehring Mud-Jack Method. The Koehring Mud-Jack raises sunken concrete . . . walks, curb and gutter, driveways, streets, highways, etc., eliminating reconstruction costs. Write for the new Mud-Jack Bulletin illustrating applications and describing the Mud-Jack Method.**

KOEHRING HEAVY DUTY

**KOEHRING COMPANY**
**MILWAUKEE • WISCONSIN**

**MUD-JACK METHOD**

*When writing, we will appreciate your mentioning* PUBLIC WORKS

**Are Your Fences in Repair?**

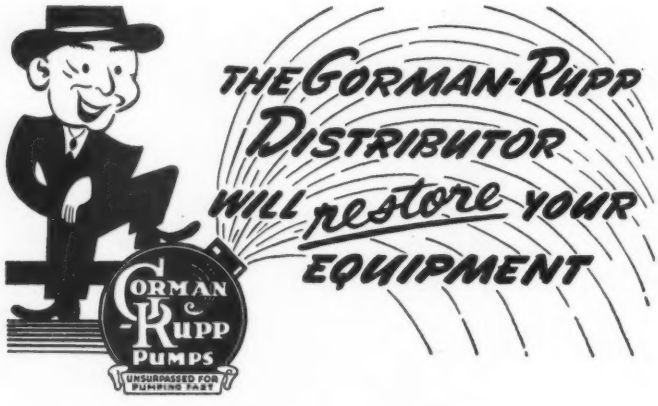
**ROT**
**is unsightly and expensive**
•
**CUPRINOL**
**Stops Rot!**

For fences, benches, sign posts, frame buildings, wharves—wherever wood construction is used—treat them with Cuprinol. 30 years successful use in Europe against Wood Rot and Insect Borers.

Cuprinol is a quick penetrating liquid, used either as a priming coat under paint or by itself, easily applied by brush, spray or dipping. It is economical and gives lasting protection.

*There is Cuprinol for Wood; for Fabrics; for Rope; for Nets. Available on priorities of A-10 or over. Write for information and descriptive booklet.*

**CUPRINOL, Inc., 24 Spring Lane, Boston, Mass.**




**As more materials are diverted to essential war uses, new equipment becomes more difficult to get. Greater care must be given present equipment until after Victory. Let your Gorman-Rupp distributor restore your equipment to its original operating efficiency. They carry parts and repairs for all equipment they sell. Their charges will be reasonable.**

**Gorman-Rupp Self-Priming Centrifugal Pumps are available for immediate delivery through Gorman-Rupp Distributors.**

**THE GORMAN-RUPP CO. Mansfield, Ohio**

*When writing, we will appreciate your mentioning* PUBLIC WORKS

## A Dry Well Replaces a Wet One for Pumping Sewage

By RICHARD W. HALTEMAN

PINE STREET, in St. Charles, Mo., slopes south to a creek where, until two or three years ago, it was dead-ended. The sewage from the vicinity north of the creek flowed to a manhole in Pine St. near the creek, from which it was pumped north in Pine St. through a 6″ transite pressure line to and over a summit with a 28 ft. lift. The vertical-shaft pump was located directly in the manhole, the motor being at ground level in what was locally called a "telephone booth" in the center of the street and operated by a tripper attached to a float.

When this section was developed it became necessary to extend Pine street south beyond the "telephone booth," and to drain a low section west of Pine street through a sewer having a grade that would bring its invert 13 ft. below the bottom of this manhole and 23 ft. below the ground surface there. To avoid such a deep manhole and remove the obstructing pump enclosure from the center of Pine St., this pump was removed and a larger one, but using the same motor, was installed at a new location on the bank of the creek about 75 ft. to the southwest, where the ground was about 7 ft. lower. A new sewer was built to bring the sewage from the old manhole to the new pump location, and a new 6″ force main from this to connect with the existing force main.

Considerable difficulty had been experienced with operating the motor in the old location, where it was directly over the manhole, due to condensation on the brushes, and at the new location the pump was set in a dry well 3 x 5 ft. inside dimensions and 18 ft. deep below the ground level. This is in contact with a 3 ft. circular manhole (built previously but not yet in use), in the bottom of which was built a sump 2 ft. diameter and 2 ft. deep, connected to the pump, in which is suspended an 8″ pipe that serves as guide to a float that controls the pump. The motor was set at ground level on a t & g floor, the well walls continuing 2 ft. 6 in. higher and being roofed over with a hood whose overhang leaves a ventilating space between it and the wall.

This installation has been in operation for over a year and there has been no condensation trouble in the motor. The new pressure pipe connects to the old with a long sweeping curve and, in spite of a lift of over 40 ft. and around a turn, this line has required no maintenance.

The work was part of a city-wide WPA sewer project. Sverdrup & Parcel were the engineers, with the author as resident engineer; following which he became city engineer.

### Responsibility for Flooding by Sewer

The city council of Omaha, as a city of the metropolitan class under the Nebraska Constitution, has power to create a sewerage district and construct therein a sewerage system, but the exercise of such power is discretionary only, not mandatory. Cities of the metropolitan class are not liable for damages caused by surface water because its storm sewers are of insufficient capacity to carry all such water.

Action was brought for damaging, by flood waters, of plaintiff's house and lots and personal property during floods in the summers of 1936 and 1937 by overloading the main sewer, filling a basement to a depth of four feet and depositing two inches of sand on the

floor and on the lawn. The property was situated near the lowest point in the natural channel of drainage before the city created a sewerage district or installed a sewerage system. The rains which damaged the property were shown to be unusual and excessive to an extent not necessarily to be anticipated when the sewerage system was planned. The evidence failed to show that the floods would not have caused damages to the same extent in the absence of municipal sewers. The Nebraska Supreme Court held (Wilson v. City of Omaha, 291 N. W. 732) that the evidence was insufficient to establish negligence of the city in construction or maintenance of an inadequate sewerage system. Judgment for the city was affirmed.

### Cutting Off Water for Non-Payment of Sewer Charges

The Ohio Court of Appeals (Gatton v. City of Mansfield, 36 N. E. 2d 306) holds that a regulation promulgated by a municipal director of public service pursuant to an ordinance permitting him to "make and enforce such by-laws and regulations as may be necessary for the safe, economical and efficient management and protection of the city's sewerage system," which provides that the water supply be cut off to residents delinquent in the payment of sewer charges, is valid, and not an unreasonable or arbitrary regulation or in conflict with section 3801-1 of the Ohio General Code, which provides the method by which a city council may by ordinance establish the charge to be paid to a municipality for sewerage service and prescribes how it shall be collected.

### County Bridge Modernization

*(Continued from page 26)*

the vital information necessary on the various structures throughout the county. The data necessary for all the bridges in the county have not yet been procured but we hope to have this system in full effect by the end of 1942.

### Installation of a New Gallery at Elkhart

*(Continued from page 15)*

in a cabinet for future reference.

After the connection had been made to well No. 2, all sheathing was pulled and the backfilling was started immediately after completion of gravel packing. The backfilling was done roughly with a bulldozer. We expect to level the surface later, sow grass seed and terrace the wells.

After completing the construction, both wells were given heavy dosages of H.T.H. and samples taken showed satisfactory bacteriological quality. The wells were allowed to stand three days without pumping.

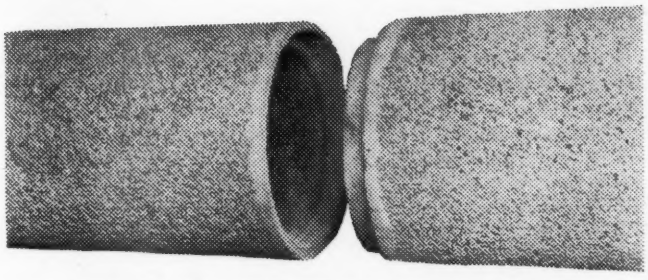
After we started pumping from well No. 1, the lift at 4 mgd was 11 ft. as compared to 18 ft. before installing the new gallery, so it can be seen that this installation is proving satisfactory. This 18″x270′ conduit has a capacity of 20 mgd, while the pump connected to well No. 1 has a capacity of 6 mgd, so this will give us plenty of reserve and take care of future requirements when a larger pump is installed. At present our peak demand is at the rate of 15 mgd during summer pumping, when the sprinkling load comes on.

Everything pertaining to this installation has been extremely satisfactory, including the cost


# "THE FASTEST DRAIN PIPE KNOWN"

## *For Quick Drainage—or Quick Water Collection*

**Whether your problem is water drainage or water collection, Walker Poroswall Rapid Drain Pipe is the answer. Its use is rapidly expanding as more and more engineers everywhere learn of its efficiencies and economies.**



**NOTE POROUS TEXTURE OF CONCRETE**

***Manufactured in Sizes 4″ to 24″***

## IDEAL FOR DRAINAGE OR WATER COLLECTION IN—

Airports
Military Training Fields
Military Highways
Filter Beds for Military Camps
Swimming Pools
Roads in Training Camps
Cantonments
Athletic and Recreational iFelds
Foundation Drainage
Cemeteries
Land Reclamation
Retaining Walls
Sludge Drying Beds
Leaching Fields
Wells

## FOR THESE 4 REASONS

① It is the fastest drainage medium known to the engineering profession.

② It is extremely permeable for its entire circumferential area.

③ No open joints to permit entrance of dirt, etc., to clog pipe.

④ Its high drainage capacity is permanent because it does not clog.

## PROMINENT USERS INCLUDE:

U. S. Engineers, U. S. Navy, and their prime contractors
Voorhees, Walker, Foley & Smith, New York
Pennsylvania Railroad Co., Philadelphia
Madigan-Hyland, Long Island City, N. Y.
Albert Kahn, Inc., Detroit, Mich.
New York Central RR., New York
Park & Sanitation Dep'ts, City of New York

# WALKER POROSWALL RAPID DRAIN PIPE

For samples of our product, specifications, additional information, etc., address:

**WALKER CEMENT PRODUCTS COMPANY**

**LITTLE FERRY, N. J.**

*When writing, we will appreciate your mentioning* PUBLIC WORKS

## Construction Contractor Not Responsible for Treatment Equipment

In an action by a construction company against a town for payment on a contract for the erection of waterworks for the town, the defense was delayed in the performance of the work for 150 days after expiry of the time limit, for which liquidated damages of $10 a day were provided by the contract. The construction company had to depend upon a subcontractor to supply the required water treatment equipment according to specifications. The construction company installed it according to the plans sent it by the subsidiary company and had the town engineer O.K. it before it would buy it. After the expiry of the contractor's time limit it was necessary for the subsidiary to send a man to reduce the iron content the required amount. There was no guarantee in the contract by the contractor as to the performance of the chemical treatment of the water. The wording of the specifications was held to show that the town meant to rely upon the guarantee of the manufacturer of the water treatment equipment and that such guarantee should accompany the bid. There was no showing as to whether or not the town got a guarantee by the manufacturer, and the court assumed it was either received or waived. It was undisputed that the town's engineers selected the manufacturer and required the contractor to buy and put in the manufacturer's equipment. Under these facts it was held that the contractor did not guarantee that the equipment for the chemical treatment of the water would accomplish the desired results and therefore was not liable for the delay. Judgment for plaintiff for the balance due on the contract was affirmed. Town of Woodland v. Carter Const. Co., Georgia Court of Appeals, 16 S. E. 2d 129.

## Sewage Treatment Plant for a Home For Mental Defectives

*(Continued from page 23)*

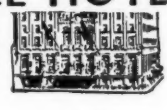
One new feature in design of this plant consists of the slot gate and two separate sludge chambers instead of one. This should eliminate the operating troubles experienced in drawing off green and partially digested sludge to the drying beds. Another new feature in design is the provision for distribution of the sewage at the entrance to the Imhoff tank, which is done by allowing sewage to flow through holes 2" in diameter in the bottom of the channel. In the event that the maximum hourly flow exceeds the flow which the 2" holes will pass, the surplus will flow over a weir. The details of this channel are shown on the sketch, "Flowing-Through Channel Dispersion Box and Weir."

The construction of this plant is finished except the installation of the rotary distributor and the sample collecting sump at the outlet of the trickling filter. If sufficient funds are available, the gas chambers of the Imhoff tank will be covered with concrete at an elevation below the sewage surface and sloping to the center of each wall. A gas collector will be located in the center of the tank with gas pipes leading to the center of each gas chamber and a flame trap and gas burner will be installed. By locating the ceilings of the gas chambers at a lower elevation than the sewage surface the sludge mat forming on the top of the gas chamber will be continuously wet and thus prevent the collection of hard, dry, thick mats of sludge.

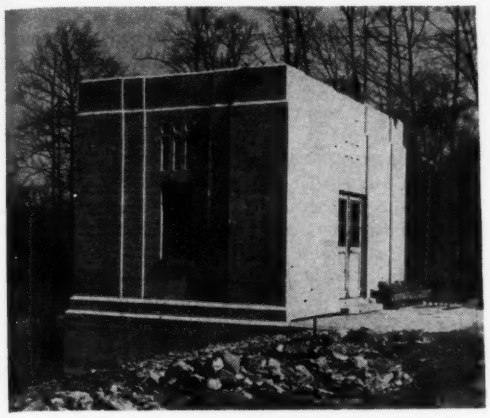
Hotstuf
TRADE MARK REG.
**Contractors Equipment**
ASPHALT HEATERS . . . SURFACE HEATERS
PAVING TOOL HEATERS AND TOOLS
HI-SPEED TRAILER TOOL BOXES
*Distributors in Principal Cities*
MOHAWK ASPHALT HEATER CO.
FRANKFORT NEW YORK

Cafe Monaco
CONTINENTAL
HANNA BUILDING, CLEVELAND, OHIO
One of the most distinguished Restaurants between New York and Chicago
THE NATURAL MEETING PLACE FOR MIDWESTERN BUSINESS MEN

**Here are a few clues.** *He dreamed the night away in one of the 891 most comfortable beds in Baltimore. Now—he's off to keep his business dates in Baltimore and Washington. He is one of the many who have found that the Lord Baltimore offers everything that's expected of a famous hotel in an equally-famous city. So—the Lord Baltimore Hotel is his GHQ in this territory.*
*Come to think of it—he could be you!*
Nearly 50 trains every day run between Baltimore and Washington. It's only a short 45 minute trip. . . . An advance reservation assures better accommodations. Let us know when you are coming.

The LORD BALTIMORE HOTEL
BALTIMORE • MARYLAND
*700 rooms—each with radio, tub and shower*


*When writing, we will appreciate your mentioning* PUBLIC WORKS



Gate house at sedimentation tank of Ashland, Ky., waterworks.

# The Waterworks Digest

**Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.**

## Hardness of South Florida Waters

A total population of over 300,000 is served by the 25 public water supplies in six counties in southeastern Florida. Ground water is served to 275,000 in 18 places and surface water to 50,000 in 7 places. Analyses of these waters made by the U. S. Geological Survey showed that 22 of them had a hardness of less than 201 ppm, and 8 (serving 70% of the total population) a hardness of less than 121 ppm. Iron content varied from 0.02 to 2.2 ppm, only 9 showing more than 0.20.[A142]

## Activated Sludge for Iron and Manganese Removal

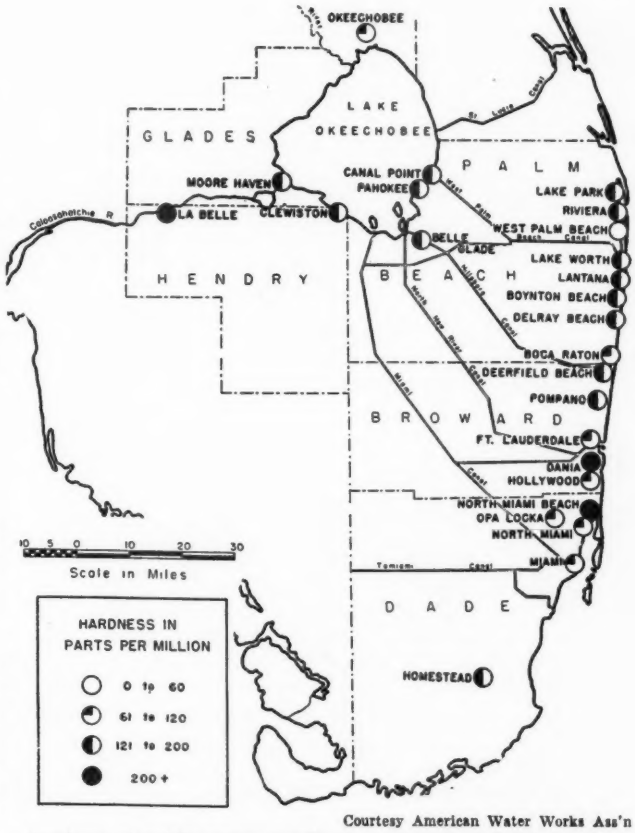
Because of the analogy between the process of iron and manganese removal by contact and oxidation, and the activated sludge process of sewage treatment, laboratory experiments were made which led to the following conclusions: 1—Suspensions of the hydrates made from ferrous sulfate and potassium permanganate are capable of removing iron and manganese from all waters tested, provided the pH value of the mixture is properly adjusted. Residual iron and manganese concentrations may be reduced by these sludges to values that would be acceptable in water treatment practice. 2—The action of the sludges is rapid, requiring not more than 15 to 30 minutes for its completion. 3—The optimum range of pH values for removal of iron is 7.0 to 9.0; for removal of manganese, from 8.5 to 10.0. Any alkaline reagent may be used to correct the pH value. 4—The activity of the sludges is not affected by either storage or continued use. 5—The concentration of sludge required for satisfactory removal of iron and manganese is of the order of 600 to 700 ppm of dry suspended solids. 6—There are sufficient indications of economy in construction cost and space required to warrant consideration of the use of active sludges for iron and manganese removal, but pilot plant experiments are needed before it can be definitely decided whether or not the process has a practical value.[B37]

## Wells Made Salt By Tidal Wave of 1938

The tidal wave that accompanied the 1938 hurricane in New England salted the water of several hundred wells located on land washed by salt water. In tubular wells no salt was tasted for about 10 or 12 days, it taking that time for the salt water to penetrate to point of well intake. Pumping out the wells increased the salt content. Over a hundred wells were examined by the State Dept. of Public Health a few weeks after the hurricane and again in November, 1941. In all cases the salt content had decreased 74% to 83% during the three years, due to salt being washed out of the soil by the rain falling thereon. In one area the average chloride content of the well fell from a maximum of 2,680 ppm and average of 735 to 770 maximum and 135 average, due to 132″ of rainfall. In another area the fall was from 3,820 maximum and 630 average to 710 maximum and 110 average, due to 153″ of rainfall. In a third the fall was from 5,160 maximum and 830 average to 530 maximum and 215 average, due to 123″ of rainfall. Considerable more time must elapse before the chloride content of these wells returns to normal.[B39]

## Los Angeles Steel Siphon

In the Los Angeles Owens River aqueduct, built in 1907-1913, were 14 steel inverted siphons under heads ranging from 67 to 850 ft. and with diameters varying from 7½ to 11 ft. All joints were riveted. The minimum thickness of plate was ¼ in. The steel was more nearly up to present standards than were the protective coatings, water gas tar having been used inside and out. Pitting has made necessary a large number of repairs to stop leaks, many pits extending entirely through the plate. Cracks




Courtesy American Water Works Ass'n

**Hardness of public water supplies in southeastern Florida in 1941.**

*See Bibliography in November issue.

resulted in the thinner plate from flexing caused by breathing and expansion and contraction stresses which would have been prevented by use of stiffeners or shorter spans between supports. Rivets in the bottom were badly worn by abrasives carried by the water. Draining the pipe for inspection and repairs caused leaks to appear, which required calking of rivets and joints extending over several leaks after each draining. Lack of rigidity also prohibited effective coating protection. A considerable part of one siphon collapsed entirely when drained and was replaced.

In 1938 it was decided to replace the lightest portions of the siphons with new welded pipe with a minimum thickness of ⅜ in., which was sufficiently rigid to prevent cracking of coal tar enamels. In designing the original siphons a value of 0.018 was assigned to *n*; at time of replacement, flow tests showed the value to be 0.015, and 0.014 was used in designing the new welded pipe which reduced the diameters from 11 ft. to 10 ft., and from 9 ft. to 8½ ft. To prevent breathing, two surge boxes were constructed at the head of the larger siphons.

In removing the old pipes, they were cut into 30-ft. lengths using cutting torches. Where the new pipe is in contact with the supporting piers, its coating is protected by two layers of 30-lb. asphalt roofing felt inserted between pipe and pier. The new pipes were lined at the plant with coal-tar enamel the thickness of which was measured by the electrical thickness gauge, and the holiday detector was used.[A144]

## Decontamination Specialists

Massachusetts has organized a technical corps of decontamination specialists with at least one representative in every vital defense area of the state. Their duties are: 1—Collection of representative laboratory samples from contaminated materials or areas. 2—Identification of contaminants. 3—Determination of the extent of area contaminated and the degree of contamination. (Decontamination measures for visicant agents in vapor and in liquid form present different problems.) 4—Acting as consultants to local civilian defense committees concerning decontamination problems—food, clothing, etc. 5—In extreme emergencies, carrying on sample laboratory tests to determine extent and nature of contamination or accurately measuring the effectiveness of decontamination procedures. 6—Serving as ambassadors of accurate public information about contaminating agents.[B31]

These specialists have been instructed, at Massachusetts State College, in the collection of bacterial samples and preparation of satisfactory sampling bottles in an emergency, the possibilities of contamination of water supplies, and the effectiveness of chlorine treatment; were given a small amount of laboratory work following standard methods for the examination of water, and an emergency method for the presumptive test for coliform bacteria.[B33]

## *Bibliography of Waterworks Literature*

***The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.***

*c*. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

A *Journal, American Water Works Ass'n*
*November*

139. Ground Water: General Nature of the Current Problem. By O. E. Meinzer. Pp. 1595-1606.
140. Ground Water: Midwest Problems. By Charles B. Burdick. Pp. 1606-1615.
141. Ground Water: Pacific Coast Problems. By Samuel B. Morris. Pp. 1615-1623.
142. Chemical Character of Public Water Supplies in Southeastern Florida. By S. K. Love and H. A. Swenson. Pp. 1624-1628.
143. Capacity Tests of Ground Water Sources at Laramie, Wyo. By R. D. Goodrich. Pp. 1629-1634.
144. *c*. Steel Siphon Rehabilitation on the Los Angeles Aqueduct. By W. W. Hurlbut, Burton S. Grant and H. Arthur Price. Pp. 1635-1666.
145. *t*. Calcium Carbonate Saturation Index and Alkalinity Interpretations. By T. E. Larson and A. M. Buswell. Pp. 1667-1684.
146. Health Departments in Wartime. By A. H. Stewart. Pp. 1685-1688.
147. Pumping Stations in the Blitz. By Henry Berry. Pp. 1689-1691.

B *Journal, New England Water Works Ass'n*
*September*

30. Guarding Public Water Supplies. By Lewis E. Moore. Pp. 265-270.


***What type of product will solve my water works problem?***

***Who are the manufacturers of it?***

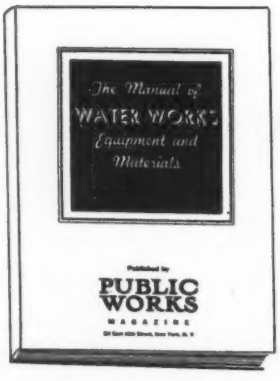
***What does it look like?***

***What other uses does it have?***

***What is the next best type?***

**ANSWERS TO QUESTIONS LIKE THESE ARE QUICKLY AVAILABLE IN**

**THE MANUAL OF WATER WORKS EQUIPMENT AND MATERIALS**




**Published Annually**

***Tells Who Makes the Products You Need***

***Describes All Types of Equipment***

**The Manual of Water Works Equipment and Materials is published by PUBLIC WORKS Magazine, price $1.00 a copy.**

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

31. Training and Organization of Technical Consultants to Deal With Chemical and Bacterial Contamination. By Leon A. Bradley. Pp. 271-275.
32. Chemical Contamination of Water Supplies. By Lazarus Rubin. Pp. 276-287.
33. Instruction in Water Bacteriology at the Massachusetts Decontamination School. By Joseph A. McCarthy. Pp. 288-293.
34. The War Dep't. Civilian Protection School at Amherst College. By Henry C. Hall. Pp. 294-301.
35. Water—A Critical War Material. By Arthur E. Gorman. Pp. 302-308.
36. Wartime Problems in the Portland Water District. By F. J. Reny. Pp. 309-319.
37. *t.* Studies in the Removal of Iron and Manganese from Water. By Edward W. Moore and Ernest A. Snow. Pp. 320-334.
38. Evolution of a Small Water Works System: Rockport, Mass. By E. Sherman Chase and George C. Houser. Pp. 335-354.
39. Salt Content of Wells in Massachusetts Affected by the Tidal Wave and Hurricane of 1938. By Vincent M. Hynes. Pp. 355-360.
40. Determination by Statistical Methods of the Average Service Life of 6" c. i. Water Mains in Brooklyn, N. Y. By A. V. Ruggles. Pp. 361-389.
41. A Statistical Method for the Estimation of Average Service Life. By C. Beverley Benson. Pp. 390-396.

D *The Surveyor*
*October 9*

3. *p.* Leeds Static Water Supplies. By W. Sleight. Pp. 345-347.

F *Water Works Engineering*
*October 21*

98. Croton Supply Is 100 Years Old. By Patrick Quilty. Pp. 1257-1261, 1292.
99. Distribution System for New York. By T. Hochlerner. Pp. 1262-1267.
100. Development of the Catskill Supply. By Charles M. Clark. Pp. 1268-1269, 1292.
101. Reducing Sub-Surface Water Waste. By Fred B. Nelson. Pp. 1270-1275.
102. History of New York's Delaware Supply. By Charles M. Clark. Pp. 1276-1277.

*November 4*

103. Safeguarding Public Health in Michigan. By Nathan N. Wolpert. Pp. 1324-1327, 1350.
104. Automatic Station Control. By Glenn C. Boyer. Pp. 1328-1330.

J *American City*
*November*

21. Philadelphia Salvages Water to Meet Wartime Demands. Pp. 44-45.
22. Ground Water Classifications in the United States. Pp. 57-58.

L *Civil Engineering*
*November*

11. *p.* Water Softening at the St. Paul Plant. By L. N. Thompson. Pp. 603-605.
12. *p.* Purification and Softening at Minneapolis. By J. A. Jensen. Pp. 605-606.
13. Silt Problems. By W. E. Corfitzen. Pp. 616-619.

M *Water and Sewage*
*October*

28. A Small Waterworks System. By Gordon A. Macdonald. Pp. 20-21, 53.
29. Consumption of Chemicals by Municipal Waterworks in Canada. Pp. 23-24, 46, 48, 49.
30. Sterilization of Water Mains. Pp. 27-28, 50-52.

P *Public Works*
*November*

41. An Underground Automatic Continuous Booster Pumping Station. By Walter Molis. Pp. 11-12, 24.
42. Measure Your Wells Now. By Wilson M. Laird. Pp. 18, 24.
43. Fundamentals for Designing Low Dams. Pp. 19-21, 34, 36, 38.

X *Boletin de Reparticao de Aguas e Esgotos*
*April*

19. A Taxa de Agua em Sao Paulo. By Jose Piratininga de Camargo. Pp. 3-21.
20. Algumas Observacoes Sobre o Funcionamento da Estacao de Tratamento de Aguas do Rio Claro. By Estanislau Blumberg. Pp. 40-52.

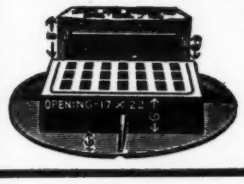
## Preference Rating Procedure Up to Date

*(Continued from page 32)*

it is probable that the War Production Board will not be able to give approval. We suggest, therefore, that you make every effort in filing such applications to give all essential technical information, particularly that pertaining to capacities of existing and proposed equipment, relationship to the war effort or public health, factual operating or control data, copies of the water analysis and any other information which may be pertinent. In addition you should include with the application a return addressed postal card so that the War Production Board may mark the case number of your application thereon and return it to you, thus making possible easier checking of the application at a later date if any correspondence becomes necessary.


**STREET, SEWER AND WATER CASTINGS**

Made from wear-resisting chilled iron in various styles, sizes and weights.




MANHOLE COVERS, WATER METER COVERS, ADJUSTABLE CURB INLETS, GUTTER CROSSING PLATES, VALVE AND LAMPHOLE COVERS

*Write for Catalog and Prices*

**SOUTH BEND FOUNDRY CO.**

*Gray Iron and Semi-Steel Castings*

SOUTH BEND, IND.

**When working up data on Water Works you will find *The Manual of Water Works Equipment and Materials* a great help.**

**The Operation of Water Treatment Plants**

Just published, in the June 1942 issue of PUBLIC WORKS, "The Operation of Water Treatment Plants" is the most up-to-date text on the subject. Contains over 25,000 words. A great help to operators and all interested in water works. Mail $1 for a copy today. If you don't think it the best you have read on the subject you may return the issue and receive your money back in full. Book Dept., PUBLIC WORKS, 310 E. 45th St., New York, N. Y.

Where Is The Largest Rotary Distributor Installation in the U. S.?

Dayton, Ohio, with twenty 165'-diameter P.F.T. units—one of dozens of installations pictured and described in Bulletin No. 213.

The engineering data it contains shows why P.F.T. Rotary Distributors are by far the most widely used. Send for a copy.

**P.F.T.** **PACIFIC FLUSH-TANK COMPANY**
4241 Ravenswood Avenue, Chicago, Ill.
NEW YORK CHARLOTTE, N. C.

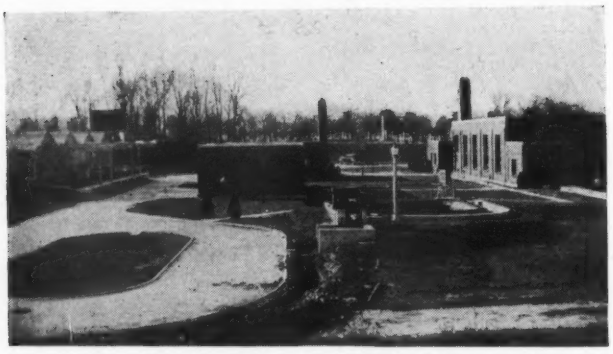
40 Years of
**WATER PURIFICATION**

**FOR MORE THAN FORTY YEARS**

We have specialized in the art of water purification. We manufacture a full line of Water Filters, both pressure and gravity types; Zeolite Water Softeners; Swimming Pool Recirculating Equipment; and various forms of Water Rectification Units. Inquiries are invited on all problems of water treatment.

**ROBERTS FILTER MFG. CO.**
640 COLUMBIA AVE. DARBY, PA.

*When writing, we will appreciate your mentioning* PUBLIC WORKS



General view of Findlay, Ohio, plant. Main building at right; sludge beds and digester at left.

# The Sewerage Digest

**Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.**

## Nitrification Of Sewage

Oxidizing organisms derive their energy from the oxidation of ammonia and nitrites, and their carbon from carbon dioxide or carbonates; organic compounds are not necessary, but do they influence the rate of nitrification? An investigation of this led to the conclusions that "oxidation of carbonaceous materials does not inhibit or retard nitrification, which can take place simultaneously, provided that: (a) the oxidation of carbonaceous materials does not create a deficiency of oxygen or available nitrogen, (b) there is an active nitrifying flora."[C67*]

## Sludge Digestion At Clevland, Ohio

Cleveland has 2,700,000 cu. ft. of separate digestion tank capacity, treating the sludge from about 120 mgd of sewage. With an average daily solids loading of 243,000 lb., there is an average daily gas production of 1,124,000 cu. ft. About 60% of the total solids, or 47% of the volatile solids, is withdrawn as digested sludge. Each tank is charged on alternate days, omitting Sundays, and clear supernatant is obtained following the week-end two-day rest. All the supernatant possible is withdrawn, and digested sludge is retained as long as possible. Usually the alkalinity and volatile content of the digested sludge are considered the best indicators of how the process is functioning. It has never been necessary to use lime. When a digester has been pumped out and cleaned, it has been put back into operation successfully by filling with supernatant and charging lightly for a few days.

The sludge produced has lost all of its objectionable character; there is no odor nuisance when it is stored in open tanks and only a faint ammoniacal odor when conditioned sludge is vacuum filtered. It is nearly self-combustible in the incinerators, only 293 cu. ft. of gas per ton of filter cake burned being used for aiding combustion in 1941.

The total operating and maintenance costs of the digestion tanks in 1939 were $1.61 per mg. of sewage treated. If all the gas produced in excess of that used to heat the digesters were sold at 33¢ a thousand cu. ft., the digestion unit would be self-sustaining financially.[G24*]

## Present Status Of Biofiltration

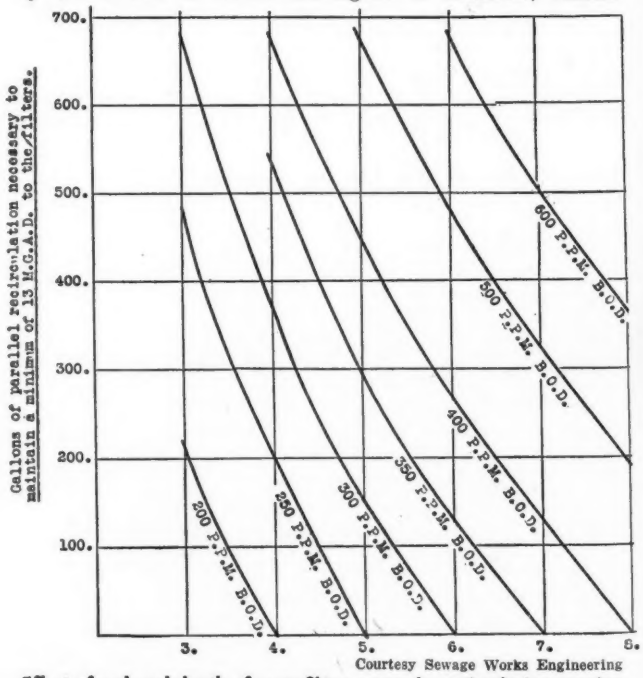
In July 1942 there were 150 biofiltration plants in operation or under construction, 93 of them in army and navy camps and bases, airports and ordnance works. These were 86 single-stage plants and 64 multi-stage. Operating experience indicates that the filter loadings recommended in the past are conservative; that a depth of 3 to 4 ft. is satisfactory; that clarifier rates may well be lowered to 800-1,000 gal. per sq. ft. per 24 hr., with 1.5-2.0 hr. detention, for both primary and secondary units. Unless the sewage being treated is very strong, it is questionable whether 2-stage treatment is preferable to single-stage, unless a finer filter medium is used in the secondary bed.

Circular beds are preferable to square or octagonal, since the corners are undosed and are excellent places for fly breeding.

For recirculation, a propeller-type pump is recommended, although for small quantities open-impeller centrifugal pumps may be used. In general, the number of arms of the distributor and rotation speed are such as to have an arm passing over any given spot once every 10 seconds.[G25*]

## B.O.D. Test of Industrial Wastes

Samples of many kinds of industrial wastes, when submitted to several different laboratories for the B.O.D. test, often yield as many different and sometimes widely differing results. This is believed to be due largely to variations in the characters of the diluting waters used in making the test. Experiments made by the authors resulted in conclusions that the suitability of a dilution water for the determination of the B.O.D. of an industrial waste can be determined by analyzing a series of dilutions made with domestic sewage. Lea and Nichols' supplemented bicarbonate water as modified by Lea, and Formula C water supplemented with nitrogen, are suitable for the determination of the B.O.D. of carbohydrate wastes, the former being somewhat superior. The natural seed in the dilution water may be sufficient, but a small inoculation with fresh sewage is desirable. The 5-day B.O.D. of waste sulfite liquor appears to be affected by the extent to which the lignin is oxidized; results




Courtesy Sewage Works Engineering

**Effect of reduced depth of aero-filters upon the recirculation requirement to provide a minimum of 13 mgad to the filters.**

*See Bibliography in the November issue.

obtained at different laboratories using supplemented dilution water should check within 25%. The 5-day B.O.D. of a 3% glucose solution was found to be independent of the amount of sewage or river water with which it was mixed, and to be only 50% of the total oxygen demand as calculated.[C70]

### Classification of Inland and Shore Waters

A subcommittee on Classification of Streams of the National Resources Planning Board classifies waters according to their highest use as follows: Class A—Waters used as sources of drinking water or for the cultivation of market shellfish. B—Waters used for bathing. C—Waters used for recreational boating, fishing, culture of seed oysters, or industrial supply after treatment. D—Waters used primarily for commercial navigation or transportation of wastes without nuisance. Ocean harbors near large sewer outlets would generally fall under D; sea water not far removed from large sewer outlets but so situated that one tide does not carry sewage effluent to the area, under C; sea water along sparsely populated shores relatively free from pollution, or sea water outside of harbors, under A; large rivers draining watersheds of large communities, under C or sometimes D; inland streams and lakes draining sparsely populated areas, under A or B; inland streams now receiving considerable pollution but not main carriers of wastes may fall in Class C, but be advanced to B by suitable treatment of sewage and industrial wastes. Classes A and B are generally clear, with D.O. near saturation, but A having less than 50 coliform organisms per 100 ml, and B less than 1,000. Classes C and D are generally free from slick, odors, or visible floating solids; there is no set standard for bacterial quality; C should be adequate for fish life, and D should have some dissolved oxygen present at all times. All waters falling below the D standard are classified as E.[C73]

### Wartime Sewage Treatment

Mr. Greeley believes it justifiable to limit treatment in war time to that sufficient to protect health, leaving a tolerable residual nuisance pollution. The load factor of a camp may suddenly be increased from say 20,000 personnel to 30,000, then drop to 5,000 when troops are in the field. Many projects may be used only for the duration—possibly less than 5 years—giving rise to questions of permanency for construction, use of automatic equipment, provision in the design for salvaging of material, minimizing use of critical material, balance between first and operating costs. Difficulty of obtaining efficient operating personnel, of bringing the plant up to full effectiveness in a few days, etc., can be compensated for by liberal chlorination, using calcium hypochlorite solutions mixed in wooden tanks and fed by orifice control devices. Other methods of minimizing use of critical materials suggested are use of heavy unreinforced concrete, elimination of mechanism, substitution of wood for structural steel, use of wood, plain concrete, asbestos cement, or vitrified clay conduits in place of metal or reinforced concrete pipe, and of wooden sluice gates, stop logs and shear gates in place of valves or metal gates.

Trickling filters require less critical material than activated sludge plants, and high-rate filters less than standard. Intermittent sand filters require practically no critical materials and these and sewage ponds can be used in some cases. Sludge treatment in unheated digestion tanks and drying on open sand beds may be the best solution of the sludge problem; or heating the sludge by steam introduced directly into it.[E18]

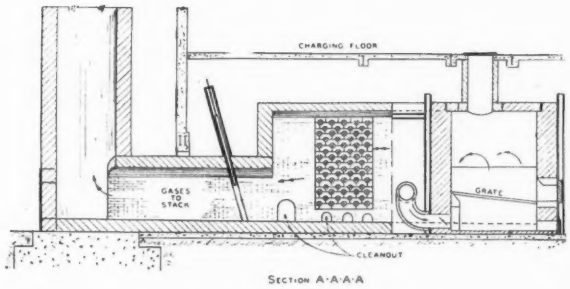
### Aero-Filter Results In Operating Plants

Study of operating aero-filter plants since the introduction of this type six years ago leads to the following conclusions:

HEAVY-DUTY INCINERATION
MORSE BOULGER
DESTRUCTORS
FOR THE
INCINERATION OF MUNICIPAL WASTES
GARBAGE, RUBBISH, SEWAGE SCREENINGS AND SLUDGE
FOR COMPLETE INFORMATION CALL OR WRITE
MORSE BOULGER DESTRUCTOR CO.
HOME OFFICE: 216-P East 45th St., New York, N. Y.

NATCO UNIFILTER TILE FOR TRICKLING FILTER SYSTEMS
*One piece underdrain*
*Egg-shaped run-off*
*Rapid, complete ventilation*
*Salt glazed surfaces*
*Write for literature on Natco glazed segmentile for corrosion resistant walls of circular filter beds*
NATIONAL FIREPROOFING CORP.
PITTSBURGH PA.

"FITCH"
RECUPERATORS
FOR
INCINERATORS



SECTION A-A-A-A

AN INCINERATOR necessity is a good recuperator. "Fitch" Recuperators combine Thermal Conductivity, Great Strength and Accessibility.
*Write for Bulletin No. 11*
"RECUPERATORS FOR INCINERATORS"
FITCH RECUPERATOR CO.
PLAINFIELD NEW JERSEY

*When writing, we will appreciate your mentioning* PUBLIC WORKS

Up to a loading of approximately 2.0 pounds of B.O.D. applied (settled sewage basis) per cubic yard of rock to an aero-filter, the percentage removal by the filter and following clarifier remains constant at about 78%. Application in excess of this amount results in a decreasing percentage of removal as the rate of loading increases. A maximum of 11.6 pounds per cubic yard of rock (18,700 lbs. per acre foot) has been applied to the first stage filter of a two-stage plant.

Properly designed single-stage aero-filter plants will provide overall reductions of the B.O.D. ranging from 85 to 90%, without heavy parallel recirculation. Two-stage plants will give overall reductions ranging from 92 to 98%, without parallel recirculation, depending upon the removal through the primary clarifier.

The top layers of filter rock are more efficient than the lower layers. However, two aero-filters having the same rock volume but of different depths give the same B.O.D. reductions. In general, the shallower filter is higher in first cost and has a higher operating power requirement than the deeper unit.

No advantage in filter efficiency is gained by recirculation of the plant effluent through the primary clarifier instead of to the primary clarifier effluent.

Clarifiers used with aero-filters are kept to a minimum size since parallel recirculation is not used except to maintain 13 m.g.a.d. to the filters.

The author gives loading curves to serve as a guide in designing and constructing such filters.[H54]

## *Bibliography of Sewerage Literature*

***The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.***

*c.* Indicates construction article; *n,* note or short article; *p,* paper before a society (complete or abstract); *t,* technical article.

D *The Surveyor*
*October 2*
27. *p.* Collection, Concentration and Fortification of Kitchen Waste. By D. J. Howe. Pp. 335-336.
*October 23*
28. *p.* Practical Difficulties of River Pollution Prevention. By A. Seaton. Pp. 363-364.
*October 30*
29. *p.* Some Recent Developments in the Biological Treatment of Settled Sewage. By M. Lovett. Pp. 371-373.

E *Engineering News-Record*
*November 5*
18. *p.* Sewage Treatment to Meet War Needs. By Samuel A. Greeley. Pp. 81-83.
*November 19*
19. *p.* Wartime Maintenance of Facilities for Sewage Disposal. Pp. 77-79.

H *Sewage Works Engineering*
*November*
54. Aero-Filter Results—Predictions and Performances. By J. A. Montgomery. Pp. 553-562.
55. Grit Removal Methods at Olean, N. Y., Treatment Plant. By Nelson M. Fuller. P. 562.
56. Sewage Treatment Plants in U. S. A. Pp. 566-567.

J *American City*
*November*
14. Sewage Treatment Plant Made Attractive and Functional. By J. E. Motheral. Pp. 51-52.
15. Pre-Aeration: Its Function in a Sewage Works. By Henry W. Taylor. P. 67.

K *Proceedings, American Soc'y of Civil Engineers*
*November*
4. Advances in Sewage Treatment and Present Status of the Art. Committee Report. Pp. 1559-1584.
5. Sewer Rental Laws and Procedure. Committee Report. Pp. 1585-1616.

L *Civil Engineering*
*November*
11. What's Wrong With Sanitary Engineering? By George E. Symons. Pp. 393-394.

M *Water and Sewage*
*October*
7. Control of Pollution From Sewage Effluents. By Norman J. Howard. Pp. 17-18, 42.
8. Separate or Combined Sewers? By W. M. Scott. Pp. 19, 43.
9. Removing Grease and Floating Solids From Sedimentation Tanks. By E. J. Hamlin. Pp. 22, 54.

P *Public Works*
*November*
35. Effect of Lime in Coagulation of Sewage. By Willem Rudolfs. Pp. 15-17, 34.
36. Restoring Streets After Sewer Construction. By Elton F. Durfee. Pp. 22-24.
37. Treatment of Industrial Wastes. Pp. 25-26.
38. *n.* Wood Septic Tank in Baltimore. P. 30.
39. Effect of Industrial Wastes on Sewage Disposal. P. 32.

X *Boletin de Reparticao de Aguas e Esgotos*
*April*
24. Estacao de Tratamento de Esgotos do Ipirango. By J. P. Jesus Netto. Pp. 22-31.

X *The Contract Journal*
*October 7*
25. Post-War Prospects in the Sewerage Field. By A. E. Berry. P. 757.


**OPENS FLAT**

**246 Pages**
**265 Illustrations**

# A YEAR'ROUND EXHIBIT

## of Equipment and Materials for Sewage Disposal

***"A Great Help When Looking Up Data on Sewage Disposal" Say Leading Engineers***

The Manual of Sewage Disposal Equipment and Sewer Construction is not just a catalog but an *expert* digest of hundreds of catalogs together with a review of the latest methods. Descriptions of products are arranged for convenience in reference—by purposes to be served. A separate chapter discusses the most approved methods to be followed in each step in design and construction, and all products available for use in each stage are covered in appropriate chapters.

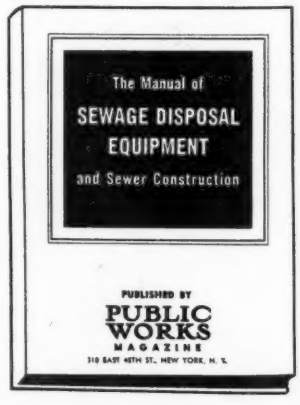
Known to engineers throughout the nation as the *Standard Source of Unbiased Information* on sewage disposal equipment, the Manual is an indispensable aid in choosing the right equipment or material to accomplish the purpose in mind.

### *New Features of 1942 Edition*

A new chapter on "Maintenance of Equipment" contains information of special value right now. Other innovations include a number of complete catalogs of equipment with detailed specifications; a catalog describing and pricing 165 pieces of laboratory equipment. A directory of consulting engineers and an expanded product index help to make this the most comprehensive Sewage Manual we have ever published. It is 50% bigger than any previous edition.

### CONTENTS INCLUDE

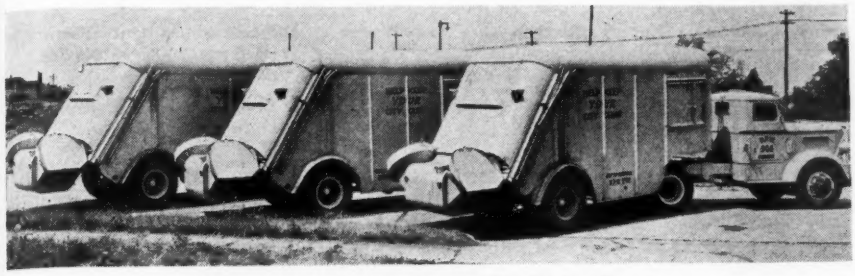
**Removal of Screenings and Grit**
**Removal of Fine Suspended Matter**
**Activated Sludge Treatment**
**Sewage Sludge Digestion and Gas Utilization**
**Oxidizing Beds**
**Disposal of Screenings and Sludge**
**Use of Chemicals**
**Pumps for Sewage and Sludge**
**Equipment for Operation Control**
**Maintenance of Equipment**
**Sewers and Sewer Construction**
**Maintenance of Sewers**
**Construction Materials and Equipment**




If you don't have a copy on your desk, send $1.50 for one today. If you are not more than pleased you may send it back within 10 days for full refund.

**PUBLIC WORKS Magazine, 310 East 45th St., New York, N. Y.**

# Keeping Up With New Equipment



Milwaukee's new conveyor-type garbage trailers.

## Garbage Trailers in Use in Milwaukee

The city of Milwaukee has installed a conveyor-type garbage trailer. This type was selected because the power equipment can be used for other purposes when the garbage trailers are not required. In the daytime the tractors pull the garbage trailers while at night they are used with street flushers and in the wintertime for snow-plowing.

The trailers were built by the Fruehauf Trailer Co. and the garbage bodies by The Heil Company of Milwaukee. Each unit is of 21 yds. capacity and equipped with an hydraulically operated end gate and conveyor with an electric safety push button stop switch and a conveyor reverse control located at the rear. The hoist is a model AT-73-78 Heil telescopic hoist, with pump reverse tank, power drive fifth wheel and cab controls.

The refuse is dumped into the receptacle at the rear on a conveyor belt and then moved up toward the front of the body, thereby assuring an even distribution of the load and at the same time, due to its enclosed body, eliminating odors. The entire end gate is hydraulically operated for quick unloading of the refuse.

## Wood Manhole Lids Fill Wartime Need

*National Lumber Mfrs. Assn. Washington, D. C.*

First tried by Los Angeles county, California, the wooden manhole covers built of solid timbers specially treated with a salt preservative to resist termites and decay are said to have proved successful.

The Los Angeles county surveyor's office developed the wooden substitutes and Surveyor Alfred Jones asserts the idea is suitable for city and county use throughout the nation.

These wooden lids may be constructed in either circular or hexagonal design by laminating short lengths of plank. They may be built in local woodworking shops without extensive fabricating equipment. Tests show that the pressure-treated wooden covers have ample strength and durability.

## First-Aid Fire Protection With Fire Barrels Freezeproofed With Calcium Chloride

Water freezeproofed with calcium chloride affords year-round protection as it will not evaporate nor become foul, and neither will mosquitoes nor other water organisms breed in it. Thus you insure vital "first-aid" fire protection that is always ready for instant use when you have calcium chloride protected fire-barrels and fire-pails on the job.

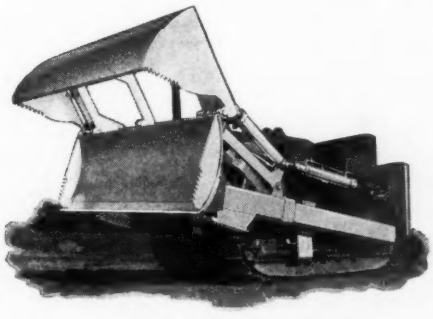
The use of calcium chloride for fire barrels has the approval of the Federal Government and National Board of Fire Underwriters. Write Calcium Chloride Association, 4145 Penobscot Bldg., Detroit, Michigan, for Brief No. F-62.

## Drott Bull Clam Handles a Wide Variety of Construction Jobs

*Hi-Way Service Corp., 3841 W. Wisconsin Ave., Milwaukee Wis.*

It is said this new development handles most shovel jobs, everything a bulldozer will do and all scraper operations, plus the work of many other units.

Hydraulically controlled from the driver's seat, it digs, carries or floats material, dumps it—cuts smoothly and spreads evenly. Depth of the cut is regulated by the raising and lowering of the clam. By moving forward, the dirt "boils" into the shovel leaving a level footing for the tractor at all times. The material is moved the shortest route in any direction, because the load is always ahead of the tractor. Either end of the Bull clam may be tilted independently to a 24" angle from the driver's seat while the tractor is in motion. The shovel is built close to the tractor and is perfectly balanced, running free of the tractor.



Drott bull clam has many uses.

According to the manufacturer, it removes trees and stumps and carries them to their destination; hauls big boulders, snow or ice; tamps fills, breaks open drains, lays pipe or tile or cable lines, is ideal for removing mud from hauling roads and refilling with dry material. By keeping the clam wide open, the outfit may be used as a bulldozer without obstructing the view of the operator.

Available in various sizes, the Bull Clams are made to fit all makes and models of tractors and have heaped capacity ranges of one to four cubic yards. Their lifting capacities are three to twelve thousand pounds. Objects or material may be carried as high as three feet above ground. The drop below ground level is one foot.

Full information may be obtained from the manufacturer.

## A Business That Started With a Handshake

On March 1, 1933, a rather cold day, J. C. Gorman and H. E. Rupp, both engineers, met on a street corner in Mansfield, Ohio. They had in mind a new pump and after a brief discussion they agreed to attempt to develop it and evidenced their faith in each other by shaking hands.

A short time later, when the depression had reached its depth, they organized the Gorman-Rupp Company and due, to a large extent, to the lack of capital, the first factory was a barn shared with Mr. Rupp's cows and sheep on his farm 2½ miles from Mansfield. It was in that cow barn that the Gorman-Rupp pump was born.

Progress was slow and hard. Sometimes they were engulfed with deep despair, but Gorman and Rupp were saturated with an idea for a new pump and were determined to develop it. They worked in that barn mentally and physically day after day, regardless of hours, until the first pump was ready for testing. But even after a successful demonstration, the horizon was far in the distance.

Again restricted finances presented its usual problems and progress was slow at first. The big headache was in marketing their new self-priming centrifugal pump. Fortunately some dealers with whom they had former business relations became distributors. Then within a short period sales began to come in and consistently increase. By that time they had out-

*Continued on page 52*

# DIRECTORY OF CONSULTING ENGINEERS

## ALBRIGHT & FRIEL, INC.

*Consulting Engineers*

WATER, SEWERAGE, INDUSTRIAL WASTE, GARBAGE, POWER PLANT AND VALUATION PROBLEMS.

1520 Locust St. Philadelphia, Penna.

---

JOHN W. ALVORD
CHARLES B. BURDICK
LOUIS R. HOWSON
DONALD H. MAXWELL

## ALVORD, BURDICK & HOWSON

*Engineers*

Water Works, Water Purification Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation

Civic Opera Building Chicago

---

## BLACK & VEATCH

*Consulting Engineers*

Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports and Laboratory Service.

E. B. Black N. T. Veatch, Jr.
A. P. Learned H. F. Lutz
F. M. Veatch J. F. Brown
E. L. Filby

4706 Broadway, Kansas City, Missouri

---

## FLOYD G. BROWNE

*Sanitary Engineer*

Reports Design Operation
Technical Supervision

Water Works — Sewage Treatment Works — Industrial Wastes Treatment — Laboratory Analyses

Marion, Ohio

---

## BUCK, SEIFERT AND JOST

*Consulting Engineers*

(FORMERLY NICHOLAS S. HILL ASSOCIATES)

Water Supply Sewage Disposal
Hydraulic Developments

Reports, Investigations, Valuations, Rates, Design, Construction, Operation.

Management, Chemical and Biological Laboratories

112 East 19th Street
New York City

---

## JAMES M. CAIRD

Assoc. Am. Soc. C. E.

*Chemist and Bacteriologist*

Water Analysts and Tests of Filter Plants

Office and Laboratory

Cannon Bldg., Broadway & 2nd St., Troy, N. Y.

---

## CONSULTING ENGINEERS

You can reach the whole CITY-COUNTY market effectively by publishing your card in this one magazine.

Write for Rates

---

## A. W. DOW, Inc.

*Chemical Engineers*

Consulting Paving Engineers

Mem. Am. Insti. Ch. Engrs.

Asphalt, Bitumens, Tars, Waterproofing, Paving, Engineering Materials

801 Second Avenue New York

---

## GANNETT, EASTMAN & FLEMING, INC.

*ENGINEERS*

Harrisburg Penna.

---

## WILLIAM A. GOFF

*Consulting Engineer*

Private and Municipal Engineering
Sewerage, Sewage Disposal
Water Supply and Treatment
Garbage, Refuse, Industrial Wastes
Design, Supervision, Valuations, Reports

Broad St. Station Bldg., Philadelphia

---

## GREELEY AND HANSEN

*Engineers*

Samuel A. Greeley Paul Hansen
Paul E. Langdon Kenneth V. Hill
Thomas M. Niles Samuel M. Clarke

Water Supply, Water Purification, Sewerage, Sewage Treatment, Flood Control, Drainage, Refuse Disposal.

6 N. Michigan Ave. Chicago

---

## HOWARD R. GREEN CO.

*Consulting Engineers*

DESIGN AND SUPERVISION OF MUNICIPAL IMPROVEMENTS

Water Works and Treatment—Sewers and Sewage Disposal—Investigations and Valuations

208-10 Bever Bldg., Cedar Rapids, Iowa
Established 1913

---

## METCALF & EDDY

*Engineers*

Water, Sewage, Drainage, Flood Relief, Garbage and Industrial Wastes Problems

Laboratories Valuations

Statler Building 150 Broadway
Boston New York

---

## MALCOLM PIRNIE

*Engineer*

Water Supply, Treatment, Sewerage Reports, Plans, Estimates, Supervision and Operation, Valuation and Rates

25 W. 43d St. New York, N. Y.

---

## RUSSELL & AXON

Geo. S. Russell—John C. Pritchard
Joe Williamson, Jr.—F. E. Wenger

*Consulting Engineers, Inc.*

Sewerage, Sewage Disposal, Water Works, Filtration, Softening, Power Plants

4903 Delmar Blvd. St. Louis, Mo.

---

## FOSTER D. SNELL. INC.

An organization of 20 chemists and engineers having laboratories for bacteriology, analyses, research and physical testing rendering

*Every Form of Chemical Service*

Disposal of sanitary and industrial waste. Water supply and purification Consultation

305 Washington St. Brooklyn, N. Y.

---

## ROBERT AND COMPANY

INCORPORATED

*Architects and Engineers*

Water Supply
Sewage Disposal

ATLANTA, GEORGIA

Incinerators
Power Plants

# GRIT REMOVAL at LARGE and Small Plants

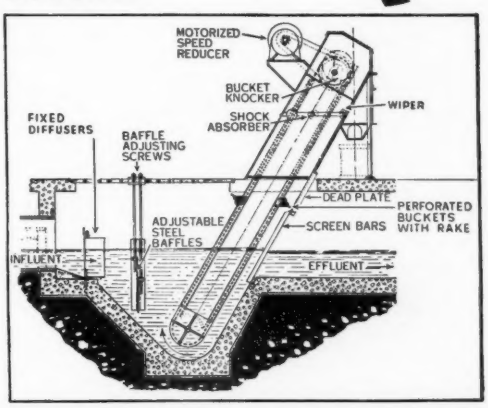
Remove grit at the earliest possible stage in the treatment of sewage, or it will cause trouble all along the line—in excessive wear on pumps, clogging of valves and siphons, etc. Because it is designed and constructed to keep operating costs at a minimum, with efficiency and flexibility to meet varying conditions, Link-Belt equipment is preferred by many progressive communities everywhere.

**LINK-BELT COMPANY**

Philadelphia Chicago Cleveland Indianapolis Los Angeles Toronto

## Tritor Screen

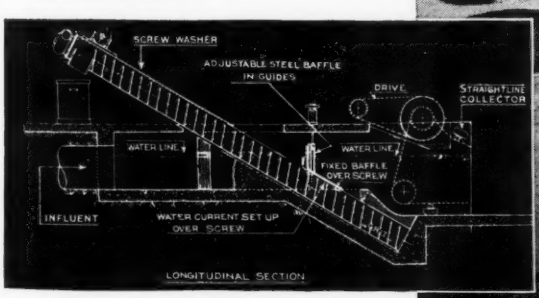
The Link-Belt TRITOR Screen illustrated by the drawing at the right, is a unit which combines the functions of a mechanically cleaned bar screen and grit chamber. For small and medium size plants.




## STRAIGHTLINE Grit Collector and Washer

The rectangular-shaped grit chamber, as used with the Link-Belt grit collector and washer, is usually more efficient in settling action than chambers of other shapes. The washing and dewatering screw of the Link-Belt unit is provided with means for close regulation of the wash water, assuring a low percentage of putrescible material and moisture in the detritus. The grit is removed from the chamber and delivered to the screw washer by means of the STRAIGHTLINE collector. (See drawing below.)

The drawing below shows a section of a Link-Belt STRAIGHTLINE Collector and Washer showing principally the washing and dewatering screw.



General view of Joint Meeting Treatment Plant at Elizabeth, N. J., with Link-Belt STRAIGHTLINE Grit Collectors and Washers in the foreground.

8937

# LINK-BELT

**SCREENS · COLLECTORS · AERATORS · GRIT CHAMBERS · MIXERS**

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

# Have You "Slacker" Sewers?

These are no days for reduced capacities, whether they be in men, machines, or sewers. If your sewerage system is making a half-hearted showing under war time overloads the answer may not be larger sewers or better sewers but better-performing sewers.

## RESTORE WITH STEWART EQUIPMENT

Get the most out of what you have by cleaning with STEWART equipment. Restore them to full capacity and keep them that way. Whatever the job to be done, STEWART rods, tools, and other equipment can help you to do that—easily, speedily, and economically.

**SEWER AND CONDUIT RODS**

**Just one item of the large STEWART line.**
**There's STEWART equipment for every need.**

## AVOID WASTE

Working without proper equipment is too wasteful for war time conditions. As the first step to speed-up, get the new complete STEWART catalog. Check your needs by it, then consult us about our various plans for increasing your sewer capacities. This is *saving* money, not spending it. Address, without obligation:

**W. H. STEWART**
P. O. BOX 767 SYRACUSE, N. Y.
*"Since 1901"*

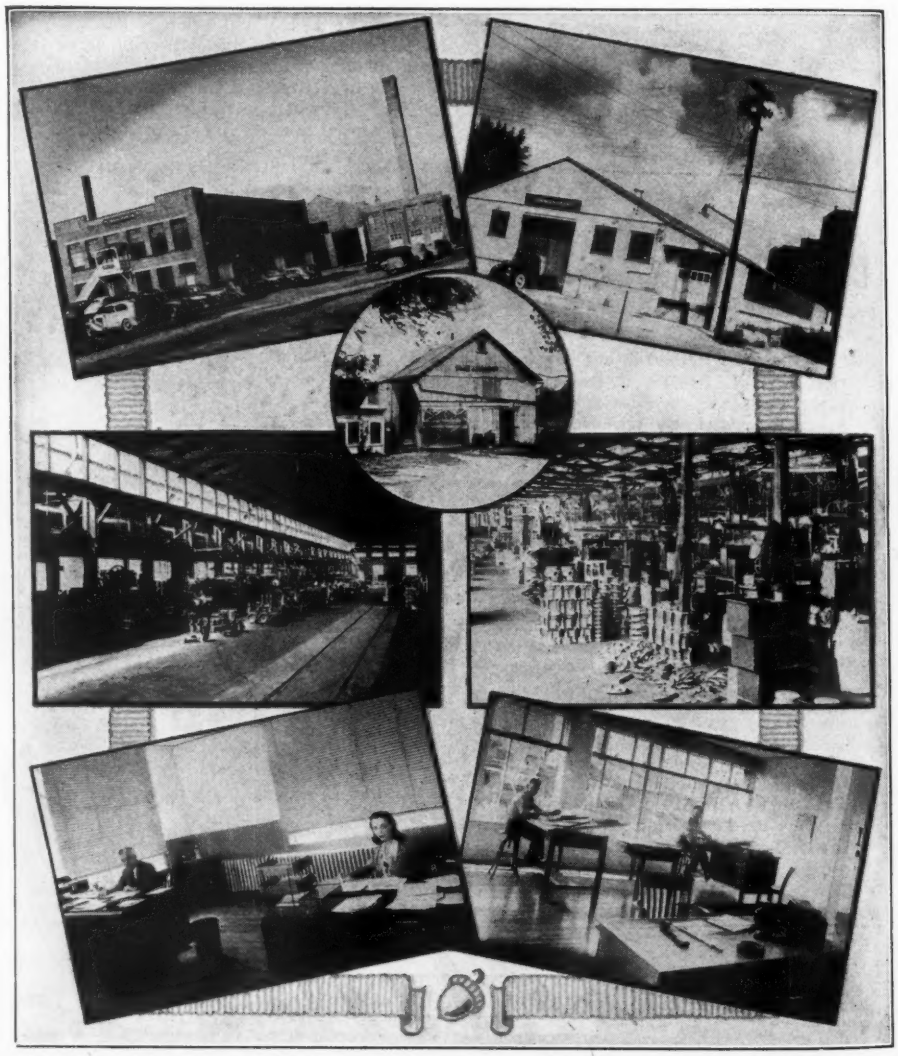
grown the barn factory and moved into a new building which at first looked so big that it seemed possible some of the space might never be needed. But progress was on the march. In seven short years the need for larger quarters became apparent and as there was no way of expanding the space in the building then used, it was necessary to move again to a still larger new factory, where the business is now housed. It is 120 feet wide by 400 feet long, built of brick and steel, with a wood floor on concrete. Even that space was found insufficient and another building on the east side, 60 by 100 feet, was secured and connected by an overhead covered bridge. The second floor of that building is used for the general office bordered by large private offices, and the ground floor is used for experimental and research purposes.

A railroad track enters the middle of the main building, extending for approximately 200 feet. That makes the handling of raw materials and unloading coal from hopper bottomed cars, lumber, engines, and other materials easy and inexpensive. A railroad siding extends the full length of the building on one side.

In planning the new factory the comfort of the employees was of major consideration. On the mezzanine floor there are two large rooms. One filled with lockers where the men may change their clothes and the other having adequate toilet facilities. Large factory wash basins and showers are provided so that the men may clean up before leaving the plant.

Employee relations have always been of the most favorable nature. Long before the wage and hour law took effect the company was paying time and a half for overtime, based on a 44-hour week. Vacation privileges, group insurance, Christmas savings plan and bonuses have been contributing factors in the negligible labor-turnover experience. All employees serving in the armed forces are considered "on leave" and will return to their jobs at the completion of their service.

The same fair play treatment is reflected in distributor relations. Many distributors acquainted with Mr. Gorman and Mr. Rupp, over a large period of years, rallied to the Gorman -Rupp standard with the establishment of the new firm. Among the first distributors to handle the new line of Gorman-Rupp pumps were: H. B. Trevor Corporation, Buffalo, N. Y.; Day & Maddock



**First Gorman-Rupp factory (circle); second factory (upper right); present modern building (upper left), and other views of their up-to-date plant.**

Company, Cleveland, Ohio; Herman M. Brown Co., Des Moines, Iowa; Alamo Iron Works, San Antonio, Texas; Harron, Rickard & McCone Co., Los Angeles and San Francisco, Calif.; Anderson Equipment Co., Omaha, Nebraska; G. W. VanKeppel Co., Kansas City, Mo.; Thorman W. Rosholt Co., Minneapolis, and Duluth, Minn.; W. C. Caye & Co., Atlanta, Ga.; Wilson, Weesner, Wilkinson Co., Nashville and Knoxville, Tenn.; and Parker-Danner Co., Boston, Mass., all of whom are actively engaged in distributing the line today. The list of distributors carrying stocks of pumps has grown consistently so that today Gorman-Rupp Company can lay claim to the statement that you can find a Gorman-Rupp distributor stocking G & R pumps in all principal cities.

### Wartime Trident Meters

*The Neptune Meter Company*
*50 West 50th Street, New York*

The company announces that its line of Trident cold water meters and repair parts in all sizes and types are now being manufactured to meet the material restrictions of War Production Board's Water Meter Limitation Order L-154.

All cast iron parts are given a protective coating of corrosion-resisting paint and steel bolts, studs, nuts and washers have a protective plating.

It is claimed that all parts manufactured will be interchangeable with those of meters already in service in accordance with the established policy of the Neptune Company.

Lambert and Thomson meters will not be manufactured for the duration of the war. However, repair parts for these meters will be available and will meet the WPB material restrictions.

### Graver Water Filters

*Graver Tank & Mfg. Co.,*
*East Chicago, Ind.*

The above is the title of a 12-page catalog describing and illustrating the Graver pressure type water filters. It explains how the Graver filters meet rigid requirements and includes certain detailed information which those contemplating the installation of water filters should have. Copies will be mailed to those who are interested upon request.

### Laboratory Handbook on Soil-Cement Mixtures

*Portland Cement Association,*
*33 West Grand Ave., Chicago, Illinois*

It is principally devoted to the methods of making tests to insure dependable results with soil-cement mixtures.

The moisture-density test, the wet-dry test, the freeze-thaw test, and compressive strength test are covered in detail. Also discussed at length are methods for identifying and classifying soils so that they can be grouped according to their common characteristics; tion in selecting samples of soil for and methods for utilizing this informa- soil-cement testing.

The Handbook also covers a brief review of research on soil-cement mixtures. It is free upon application.

### The Graver Chemical Mixing Tank

*Graver Tank & Mfg. Co.,*
*East Chicago, Ind.*

A new folder has just been issued by the manufacturers describing the vertical cylindrical type, the horizontal rectangular type, the Graver chemical proportioner, and the Graver remote control chemical proportioner. The manufacturer says that the chemical mixing tank embodies numerous improved features which contribute materially to its efficient and accurate operation. The folder also describes how the Graver chemical proportioner supplies chemicals in direct proportion to the flow of incoming water. Those concerned with mixing and proportioning chemicals will find this folder interesting and informative.

### New Catalog on Link-Belt LS-120 Shovel, Dragline, Crane

*Link-Belt Speeder Corporation*
*307 N. Michigan Ave., Chicago*

A new 12-page illustrated catalog No. 1943 has been published by Link-Belt Speeder Corporation, 301 West Pershing Road, Chicago, on their 1¼-yd. heavy-duty model LS-120 crawler shovel, crane, dragline.

OUR CHRISTMAS WISHES FOR YOU . . .
May your holiday be drifted high with gifts and giving, with happiness and friends.
May your Christmas be a brisk and cheerful island in this year's savage seas.
May your New Year be a turning point towards constructive, peaceful days.
May your 1943 be useful, busy, prosperous. May you find it crowned with Victory.
May you never forget our thanks for years of cordial dealings.
May you continue to understand our war-caused delivery problems, and may you, like ourselves, close soon the biggest, busiest, hardest year of your entire history.
MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1903
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

Among the features of this machine are these: All-welded unit construction instead of castings; self-aligning center pin bearing; self-aligning rotating rollers, and fully independent rapid boom-hoist.

Of particular interest should be the information given on the LS-120 pull shovel. The front-end attachment of this unit is of completely new design and permits deeper and more positive digging than before.

Book shows both construction details and installation views. General dimensions, clearances, lifting capacities, specifications are given.

A copy of new catalog will be sent to any interested reader on request.


**VENTURI METERS**

*Type M Register-Indicator-Recorder*

**Water Works men have so long relied upon Builders Venturi Meters for accurate records of main line flow that we suspect they sometimes just take it for granted that they know all about them!**

**Do you? Have you the latest bulletins on file? Look and see; if you haven't Bulletin 293 B, we suggest you write Builders - Providence, Inc., 9 Codding Street, Providence, R. I., and ask for a copy.**

**Sincerely yours,**

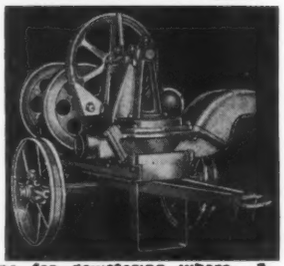
BUILDERS
WATER AND SEWAGE WORKS *Equipment*



**C.H.&E.**

**SINGLE and DOUBLE DIAPHRAGM PUMPS**

**SEWAGE and TRASH PUMPS**



A complete line for dewatering where foreign material and slow seepage are encountered. 3" or 4" suction, open or enclosed gears, open or enclosed discharge, straight line water flow and many other features. Powered with horizontal and vertical engines of every type. Send for Bulletin DP41.

Also send for catalogs on SAW RIGS, HOISTS, MORTAR MIXERS, BAR BENDERS and CUTTERS, and TANDEM ROLLERS.

C. H. & E. MFG. CO.,
3841 No. Palmer St.,
Milwaukee, Wis.


## New Traxcavator Excavating Bulletin

*Trackson Company, Milwaukee, Wis.*

"Let's Dig In and Win" is the title of a new bulletin featuring the use of Traxcavators for a variety of excavating jobs.

Interesting action pictures show these heavy duty tractor excavating and loading machines digging and moving dirt for the construction of airports, defense plants, defense housing, and highways —for digging in clay pits, etc. Included also are mechanical views and specifications of the three models—T2, T4 and T7—and other action views showing Traxcavators digging in toughest soils, loading the excavated material directly into trucks and wagons, carrying the loads to the hauling units and to the fill—piling, casting, spreading, backfilling—one machine doing a variety of jobs.

For a copy of this interesting bulletin, write the manufacturers.

# PEOPLE—

## *Here and There*

### Missouri Chief Engineer to Be President of American Road Builders' Association

C. W. Brown, chief engineer, state highway department, Jefferson City, Mo., is official nominee for president. The nomination is tantamount to election. Mr. Brown is a native of Vandalia, Mo., a graduate of the Vandalia high school, and the University of Missouri with the degree of B. S. in Civil Engineering.

Nominees for president of ARBA divisions are James J. Skelly, president, Associated Pennsylvania Constructors, Media, Pa., Highway Contractors' Division; R. B. Traver, county superintendent of highways, Onondaga county, Syracuse, N. Y., County Highway Officials' Division; and Raleigh W. Gamble, superintendent of street construction and repairs, Milwaukee, Municipal Division.

Renominated as association vice-presidents are Paul B. Reinhold, president, Atlas Equipment Corp., Pittsburgh; Charles W. Smith, president, Smith Engineering and Construction Co., Pensacola, Fla.; Lion Gardiner, vice-president, Jaeger Machine Co., Columbus, Ohio, and Robert A. Allen, state highway engineer, Carson City, Nev. H. C. Whitehurst, District of Columbia director of highways, Washington, was renamed treasurer.

Directors named for the term ending in 1946 are R. H. Baldock, state highway engineer, Salem, Ore.; Robert B. Brooks, consulting engineer, St. Louis, Mo.; J. F. Cast, manufacturers' sales manager, Firestone Tire & Rubber Co., Akron, Ohio; Paul L. Griffith, vice-president, Koppers Co., Pittsburgh; W. R. Macatee, managing director, the Asphalt Institute, New York City; A. E. O'Brien, secretary, Associated Pennsylvania Constructors, Harrisburg, and Nello L. Teer, contractor, Durham, N. C.

### New Officers for American Public Works Association

Henry L. Howe, City Engineer, Rochester, N. Y., President; Frederick R. Storrer, City Engineer, Dearborn, Mich., First Vice President; Stuart M. Weaver, Lt. Col., U. S. Corps of Engineers, Washington, D. C., Second Vice President; Samuel S. Baxter, Lt., U. S. Corps of Engineers, Philadelphia, Treasurer. For directors: E. A. Fisher, City Engineer, Lakewood, Ohio, and William A. Xanten, Supervisor, City Refuse Division, Washington, D. C. were elected for three-year terms; and Albert P. Learned, Consulting Engineer, member of the Black & Veatch organization, Kansas City, was re-elected for two years. Other board members are: Frederick T. Paul, who was President during the past year; and W. J. Galligan, Division Superintendent, Bureau of Streets, Chicago; J. M. Graddy, Superintendent of Public Works, Columbus, Ga.; and Erwin L. Knebes, Assistant Engineer, Milwaukee, Wis.

### John A. Kienle Retires

Mr. Kienle joined The Mathieson Alkali Works, Inc. in 1920 as Manager of Sales and was elected Vice President and Director of Sales in 1922. His successor is Esse E. Routh. Robert J. Quinn becomes Asst. to the Vice President and Director of Sales, and D. W. Drummond is now General Manager of Sales. Mr. Routh has been in the employ of The Mathieson Alkali Works since completing his education at Virginia Polytechnic Institute and Davidson College—first at the Saltville, Virginia Works. From 1920 to 1928 he was Southern Sales Manager and has been General Sales Manager since 1928.

### Conventions and Association Meetings

January 20-22—American Society of Civil Engineers Annual meeting, Engineering Societies' Building, 33 West 39th St., New York, N. Y.

January 21—Sanitary Division of American Society of Civil Engineers will meet in the Engineering Societies' Building, 33 West 39th St., New York, N. Y.

January 22—Fifteenth Annual meeting of N. Y. State Sewage Works Assn., Hotel McAlpin, New York, N. Y.

# Readers' Service Department

**These booklets are FREE but distribution is restricted to those actively engaged in engineering or construction. Use the coupon below or write the manufacturer direct, mentioning PUBLIC WORKS.**

## Construction Materials and Equipment

### Air Raid Shelters

3. New 8 page booklet pictures and describes a corrugated pipe shelter with gas tight end walls, emergency escape tunnel and other desirable features. Armco Drainage Products Assn., Middletown, Ohio.

### Asphaltic Limestone

5. Characteristics, methods of laying, and results with cold lay mixture shipped ready to use. Especially adapted to resurfacing old pavements, sealcoats and airport runways. Alabama Asphaltic Limestone Co., Liberty Nat. Life Bldg., Birmingham, Ala.

### Bridges

7. Teco Connectors, a new method of structural engineering, to spread the load on a timber joint more equally over the cross-section of the wood is described in new literature available from Timber Engineering Co., Inc., Dept. BS-2, 1319—18th St., N. W., Washington, D. C.

8. Lt.-weight, non-skid, mineral surfaced asphalt planks for any type bridge. Write for latest catalog. Servicised Products Corp., 6051 West 65th St., Chicago, Ill.

### Cement Dispersion

9. "Economics of Cement Dispersion and Pozzolith" tells the complete story of how cement dispersion reduces water required up to 20% and increases workability 150%. Write The Master Builders Co., Cleveland, Ohio, for a copy.

10. A valuable treatise on available means of securing high strength, prevention of sealing, increased durability and improved wear resistance in concrete pavement construction. Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio.

### Cement, Early Strength

11. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit, Mich.

### Cold Mix Plants

15. New catalog and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus, Ohio.

### Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

### Concrete Curing

32. Tru-Cure, a newly developed compound for curing concrete, is a clear liquid that is sprayed on wet concrete immediately after finishing. Saves several hours to a day's time usually lost on the average concrete job. Write for literature and full details. Truscon Laboratories, Detroit, Mich.

33. Pocket manual of concrete curing with calcium chloride. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

### Concrete

36. "Cutting Concrete Costs"—Booklet analyzes costs and outlines methods of figuring the lowest cost schedule. Notes on job planning. For copy, write Lone Star Cement Corp., 342 Madison Ave., New York, N. Y.

### Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

### Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

### Drainage

71. Walker Poroswall Rapid Drain Pipe for Drainage or Water Collection is claimed to be the fastest drainage medium known. Send for latest literature explaining its many uses. Walker Cement Products Co., Little Ferry, N. J.

73. "Principles of Design of Airport Drainage" and other articles on airport drainage reprinted from PUBLIC WORKS Magazine are being distributed free by Bowerston Shale Co., Bowerston, O., Hancock Brick & Tile Co., Findlay, O., and Columbus Clay Mfg. Co., Blacklick, O. Address anyone of the above for a copy.

### Graders, Patrol

105. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Road Machinery Co., Aurora, Ill.

### Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee, Wis.

### Oil

109. Ring-Free Motor Oil that keeps motors clean and free from carbon, and reduces frequency of overhauls is described in literature available from Macmillan Petroleum Corp., 530 West 6th St., Los Angeles, Calif.

### Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures, 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York, N. Y.

### Pumps

120. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Portchester, N. Y.

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

### Road Building and Maintenance

128. Motor Patrol Graders for road maintenance, road widening and road building, a complete line offering choice of weight, power, final drive and special equipment to exactly fit the job. Action pictures and full details are in catalogs Nos. 253, 254 & 255, issued by Gallon Iron Works & Mfg. Co., Gallon, Ohio.

### Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio."

139. "Ironeroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. Hercules Co., Marion, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Road Mach. Co., Aurora, Ill.

### Rotproofing

145. Cuprinol, a rotproofing chemical that protects wood from fungi and insects, yet has no offensive odor, is non-poisonous, does not corrode metal and can be painted over. Get full details in booklet from Cuprinol, Inc., 7 Water St., Boston, Mass.

**USE THIS COUPON**

Readers' Service Dept., PUBLIC WORKS 12-42
310 East 45th St., NEW YORK

Please send me without obligation the following booklets listed in your READERS' SERVICE SECTION .....
(indicate by numbers)

Name .....

Occupation .....

Street .....

City ..... State .....

### Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Div., 40 Rector St., New York, N. Y.

### Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

### Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich., for Bulletin No. 29.

### Timber Structures

189. "Typical Designs of Timber Structures" contains plans for 45 representative structures that have been engineered with Teco Connectors. For free copy write Timber Engineering Co., Inc., Room 6GG, 1319—18th St., N. W., Washington, D. C.

## Street and Paving Maintenance

190. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. These are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati, O.

198. Illustrated Bulletins 15 to 20 describe Mohawk Oil Burning Torches; "Hotstuf" Tar and Asphalt Heaters; Portable Trailer Tool Boxes; Pouring Pots and other equipment for street and highway maintenance, roofing, pipe coating, water proofing, etc. Mohawk Asphalt Heater Co., Frankfort, N. Y.

## Snow Fighting

### Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

### Ice Control

351. "Make Icy Highways Safe for Traffic"—a new bulletin by Michigan Alkali Co., Wyandotte, Mich., tells how to use calcium chloride for modern ice control.

## Sanitary Engineering

### Aero-Filter

356. "Results Produced by Aero-Filters" is a new pamphlet covering results at Temple, Texas; Paris, Ill.; Webster City, Iowa; and Mason, Mich. Write Lakeside Engineering Corp., 222 West Adams St., Chicago, Ill.

### Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

### Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

### Activation and Aeration

376. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester, Mass.

377. Activated Sludge Treatment. Five booklets are available covering Stationary Diffuser Tubes, the Swing Diffuser, the Mechanical Aerator and the Combination Aerator and Clarifier. Operation of activated sludge plants. Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.

### Chlorinators, Portable

380. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark, N. J.

381. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence, R. I.

### Cleaning Sewers With Own Forces

383. A 20-page booklet describes and illustrates a full line of sewer cleaning equipment—Rods, Root Cutters, Buckets, Nozzles and Flushers. Write W. H. Stewart (Pioneer Mfr. since 1901), Jacksonville, Fla., or P. O. Box 767, Syracuse, N. Y.

### Consulting Engineers

385. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

### Feeders, Chlorine, Amonia and Chemical

387. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. % 96 Codding St., Providence, R. I.

### Fire Hydrants

390. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

391. See listing No. 410.

### Flow Meters

392. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

### Gas Holders and Digesters

393. Clarifiers, sludge digesters and other tanks and gas holders for sludge gas. Graver Tank & Mfg. Co., Inc., East Chicago, Ind.

### Gates, Valves, Hydrants

394. Gate, flap and check valves; floor stands and fittings. New catalog No. 34 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

395. Complete booklet with much worthwhile water works data describes fully Ludlow hydrants and valves. Sent on request. Ludlow Valve Mfg. Co., Troy, N. Y.

396. See listing No. 410.

### Gauges

398. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

### Lubricants

401. Lubricants. "Lubriplate," a combined lubricant and protection against corrosion, especially effective for parts immersed in sewage. An 8-page folder. Fiske Brothers Refining Co., Newark, N. J.

### Laboratory Equipment

402. Acid-proof sinks, pipes, ventilating and other equipment. Maurice A. Knight, Akron, Ohio.

403. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore, Md.

### Manhole Covers and Inlets

405. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend, Ind.

### Meters, Venturi

406. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., Codding St., Providence, R. I.

### Mixers, Chemical

407. Chemical Mixers. "Slo-Mixers" for multi-stage flocculation described and illustrated in 6-page bulletin No. 389. Chain Belt Co., 1663 W. Bruce St., Milwaukee, Wis.

### Pipe, Cast Iron

408. Handbook of Universal Cast Iron Pipe and Fittings, pocket size, 104 pages, illustrated, including 14 pages of useful reference tables and data. Sent by The Central Foundry Co., 386 Fourth Ave., New York, N. Y.

409. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

410. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia, Pa.

### Pipe, Transite

414. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York, N. Y.

### Pipe, 2-inch Cast Iron

417. Generously illustrated booklet describes McWane 2-inch cast iron pipe and its manufacture in streamlined pipe shop. Write McWane Cast Iron Pipe Co., Birmingham, Ala.

### Protection for Plants

419. Protecting sewage plants against disintegration. What to use and where to use it. Complete data with labels. Inertol Co., Inc., 470 Frelinghuysen Ave., Newark, N. J.

### Pumps and Well Water Systems

420. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis, Tenn.

### Meter Setting and Testing

430. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

### Reservoirs, Concrete

431. Data on how large reservoirs may be built at a saving as units by the

Wm. S. Hewett System of reinforced concrete construction will be sent without obligation. The Wm. S. Hewett System, 20 N. Wacker Dr., Chicago, Ill.

### Screens

434. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

### Sludge Drying and Incineration

440. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 48 pages. Address: Morse Boulger Destructor Co., 216-P East 45th St., New York, N. Y.

442. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

443. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

### Softening

444. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 4809-15 Tod Ave., East Chicago, Ind. Write for a copy of this instructive folder.

### Sprinkling Filters

445. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many timesaving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill.

### Swimming Pools

446. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

### Taste and Odor Control

449. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York, N. Y.

450. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

### Treatment

453. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill.

454. A full line of equipment for sewage disposal including clarifiers, chemical treatment plants, rotary distributors, gas holders and many other pieces of equipment are described in a new bulletin just issued by Graver Tank & Mfg. Co., 4809-15 Tod Ave., East Chicago, Ind.

455. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Company, 2045 W. Hunting Park Ave., Philadelphia.

456. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia, Pa.

457. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

458. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York, N. Y.

459. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

460. Comminutor. Booklet describes comminutor which acts as sewage screen and cuts up floating solids in the sewage. Design details, tables and blueprints. Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.

461. Prefloccula'ion without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

462. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York, N. Y.

463. Clarifiers and Digesters. Circular and rectangular clarifiers and dome roof digesters are described in a new catalog. Hardinge Co., Inc., York, Pa.

464. Rotary Distributors. Bulletin describes Infilco rotary distributors and automatic dosing siphons. Infilco, Inc., 325 W. 25th Place, Chicago, Ill.

465. Grit Washers and Collectors, by Jeffrey are built in three types: scraper, V-bucket and combination. For full details ask for Jeffrey Catalog No. 703-A. Jeffrey Mfg. Co., 948-99 No. Fourth St., Columbus, Ohio.

466. Flocculation with Floctrols. For details on controlled flocculation, tapered mixing, practical elimination of short circuiting, rapid settling of properly flocculated solds write for Catalog No. 703-A. Jeffrey Mfg. Co., 948-99 No. Fourth St., Columbus, Ohio.

467. Sludge Removers and Mixers. Chain and scraper sludge collectors; Tow-Bro sludge removers; and Rex Slo-Mixers and flash mixers for multi-stage flocculation. (Just out.) Chain Belt Co., 1679 W. Bruce St., Milwaukee, Wis.

### Underdrains, Trickling Filter

468. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh, Pa., for free copy.

### Valves (See Gates, Air Release, etc.)

### Waste Elimination

469. Full information on the Pitometer Survey—a complete check-up on your water plant to reveal hidden sources of waste—will be sent promptly by The Pitometer Co., 48 Church St., New York, N. Y.

### Water Treatment

470. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., Inc., 4809—15 Tod Ave., East Chicago, Ind., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

472. Bulletin describes stabilizing lime-softened water by recarbonation, discussing gas production, washing, compressing, drying, and applying the CO(2). Infilco, Inc., 325 West 25th Place, Chicago, Ill.

473. Water Softening. The use of the Spaulding Precipitator to obtain maximum efficiency and economy in water softening is described in a technical booklet. Permutit Co., 330 W. 42nd St., New York. N. Y.

### Water Works Operating Practices

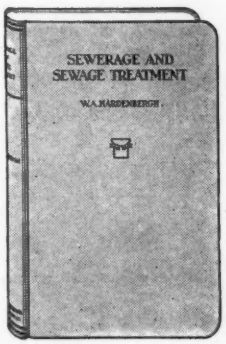
490. "Important Factors in Coagulation" is an excellent review with bibliography and outlines of latest work done in the field. Written by Burton W. Graham and sent free on request to Stuart-Brumley Corp., 516 No. Charles St., Baltimore, Md.

### Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, Ohio.


## *Have You Seen This*

# 1942 EDITION




454 pages liberally illustrated

# Sewerage and Sewage Treatment

## By COL. W. A. HARDENBERGH

Here is a bigger and better book than the earlier edition which proved so popular with sanitary engineers everywhere. The section on treatment has been entirely rewritten and design examples of all kinds worked out in detail to illustrate practical and up-to-date methods of design.

### *For the Average Engineer*

Like its predecessor, this is an authoritative yet simple treatment of the subject by one of the nation's foremost authorities. Col Hardenbergh's editorial and field work have brought him in close contact with the problems that trouble the average engineer and in this book he outlines those methods most suitable for handling the work. Particular attention is paid to sewerage systems, both storm and sanitary.

### *Partial Table of Contents*

Hydraulics of Sewers
Planning Sewerage Systems
Design of Sanitary Sewers
Design of Storm and Combined Sewers
Pumping of Sewage
Fundamentals of Sewage Treatment
Grit Removal and Screening
Sedimentation
Chemical Treatment of Sewage
Activated Sludge Process
Secondary Treatment of Sewage
Sludge Digestion and Disposal
Chlorination of Sewage
Industrial Wastes
Institutional Waste Treatment
Operation of Sewage Treatment Plants

### *Send for a copy today*

Priced at only $4.00 a copy, postpaid, this book is being sold under our regular money-back-if-not-satisfied guarantee. Mail your remittance with coupon below and if not more than satisfied with this new edition, you may return it within 10 days for full refund. PUBLIC WORKS Magazine, 310 East 45th St., New York, N. Y.

**USE THIS COUPON**

PUBLIC WORKS 12-42
310 East 45th St., New York, N. Y.
Enclosed is $4.00 for which send me one revised edition of SEWERAGE AND SEWAGE TREATMENT by Hardenbergh, in accordance with your money-back-if-not-fully-satisfied offer.

Name .....
Title .....
Street .....
City ..... State .....

**You May Need It In a Hurry!**

Keep a copy of our latest catalog in your file handy for instant reference.

Contains a complete parts list of all Murdock Outdoor Water Service Devices. Write for copy today.

*It pays to buy* **MURDOCK.**

**THE MURDOCK MFG. & SUP. CO.**
426 Plum St. Cincinnati, O.

**MURDOCK** SINCE 1853

SELF-CLOSING ANTI-FREEZING HYDRANT
"Air-Lock" ANTI-FREEZING OUTDOOR DRINKING FOUNTAIN
LARGE ANTI-FREEZING HYDRANTS 1½" to 2" INCLUSIVE
LOCK-LID STREET WASHERS
ANTI-FREEZING COMPRESSION HYDRANT

WATER

To keep running water from running away from you we prescribe your reading TESTING WATER METERS, WHY, WHEN & HOW, a forty page book just off the press which will be sent without charge to any water works man who will write for a copy.

**FORD METER BOX CO.,**
**WABASH, IND.**

# LETTERS
## *to the Editor*

COUNTY OF
SAN BERNARDINO
*San Bernardino, California*

Your November issue contains on Page 19 an article "Fundamentals for Designing Low Dams—III."

We are very desirous of obtaining copies of the issues publishing the prior installments of this article, as we find that ours have been "borrowed" and are not available.

Our flood control engineer has requested that we secure the balance of the series, and if you will forward them to us, we will be glad to remit charges.

Thank you very much for your attention to this request.

Yours very truly,
H. L. WAY
*County Surveyor.*

*Editor's note:* This is a sample of several letters we have received recently. If any other readers find their copies of the previous installments permanently "borrowed," we suggest they order duplicates now while copies are still available.

## NEW APPOINTMENTS

*New City and County Officials recently reported:*

***City Engineers***

D. C. Wesche, Manhattan, Kan.
Frank B. Hayes, Pendleton, Ore.
H. R. Gesley, Watertown, S. D.
E. G. Gore, Brownsville, Tex.
Louis Belscamper, Lancaster, Wis.

***City Manager***

Donald M. Oakes, Alpena, Mich.

***Public Works Commissioners***

R. E. Carvey, Fulton, N. Y.
Joseph A. Ranguette, Pawtucket, R. I.

***Water Works Superintendents***

R. L. Robinson, Newport, Ark.
A. V. Rossen, Cairo, Ga.
Jas. P. Kunkel, Jasper, Ind.
Frank L. Catt, Lawrenceburg, Ind.
John E. McDonald, Clinton, Mass.
W. R. Decker, Crookston, Minn.
C. M. Brock, Cleveland, Miss.
H. N. Haberer, Lowville, N. Y.
Grover E. Rickard, Oneonta, N. Y.
Walter Turner, Cambridge, Ohio.
G. Taylor Evans, Struthers, Ohio.
E. P. Smith, Baker, Ore.
James N. Moon, Media, Pa.
T. G. Braman, Washington, Pa.
Joe W. Lovell, Murfreesboro, Tenn.
A. W. Reed, Brownsville, Tex.
T. A. Camp, Mineral Wells, Tex.
J. L. Swanson, Port Arthur, Tex.

***County Engineers***

G. Conrad Miller, Logan Co., Lincoln, Ill.
Claude Hamlin, Mills Co. (Acting), Glenwood, Iowa.
Wray C. Furlong, Marshall Co., Marshalltown, Iowa.
W. M. Noland, Estill Co., Irvine, Ky.
Samuel Gould, Jr., Mahoning Co., Youngstown, Ohio.

James J. Corbalis, Jr., resigned as sanitation officer with Virginia State Health Dept. to accept a position as sanitary engineer for the organization and administration of two sanitary districts in the County of Fairfax, Va.

### Army-Navy E Awards

For excellence and outstanding records the E Pennant has been awarded to The Osgood Co., Marion, Ohio; Bucyrus-Erie Co., South Milwaukee, Wis.; and Independent Pneumatic Tool Co., Chicago.

You can reach the whole CITY-COUNTY market effectively through this ONE magazine: PUBLIC WORKS

## ADVERTISERS
### IN THIS ISSUE

Albright & Friel, Inc. ..... 50
Alvord Burdick & Howson ..... 50
Armco Drainage Products Assn. ..... 5

Barrett Div., The ..... 10
Black & Veatch ..... 50
Browne, Floyd G. ..... 50
Buck, Seifert & Jost ..... 50
Buffalo-Springfield Roller Co. ..... 39
Builders-Providence, Inc. ..... 54

Cafe Monaco ..... 42
Caird, James M. ..... 50
Calcium Chloride Assn. ..... 4
C. H. & E. Manufacturing Co. ..... 54
Cuprinol, Inc. ..... 40

Dorr Company ..... 29
Dow, A. W., Inc. ..... 50

Fitch Recuperator Co. ..... 47
Frink Mfr., Carl H. ..... 37
Ford Meter Box Co. ..... 58

Gallon Iron Works & Mfg. Co. ..... 35
Gannett, Eastman & Fleming, Inc. ..... 50
Goff, William A. ..... 50
Gorman-Rupp Company ..... 40
Greeley & Hansen ..... 50
Green Co., Howard R. ..... 50

Highway, Street & Airport Manual, Front Cover

Jaeger Machine Co. ..... 3
Johns-Manville ..... 30 & 31

Koehring Co. ..... 39

Layne & Bowler, Inc. ..... 6
Link-Belt Co. ..... 51
Lone Star Cement Corp. ..... 27
Lord Baltimore Hotel ..... 42

Macmillan Petroleum Corp. ..... 8
Manual of Sewage Disposal Equipment and Sewer Construction ..... 48
Manual of Water Works Equipment and Materials ..... 44
Master Builders Co., The ..... 2
Metcalf and Eddy ..... 50
Mohawk Asphalt Heater Co. ..... 42
Morse Boulger Destructor Company ..... 47
Murdock Mfg. & Supply Co. ..... 58

National Fireproofing Corp. ..... 47

Pacific Flush Tank Company ..... 45
Pirnie, Malcolm ..... 50

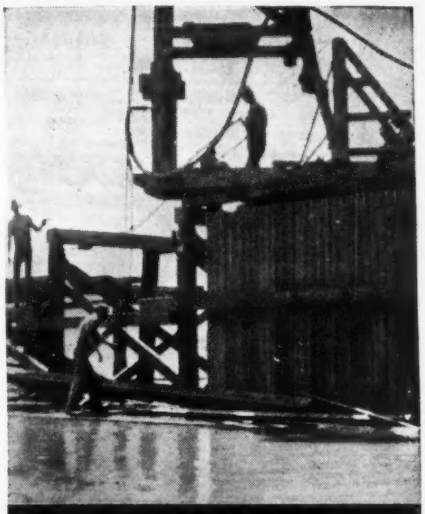
Robert & Co., Inc. ..... 50
Roberts Filter Manufacturing Co. ..... 45
Russell & Axon Cons. Engrs., Inc. ..... 50

Simplex Valve & Meter Co. ..... 33
Snell, Inc., Foster D. ..... 49
South Bend Foundry Co. ..... 45
Stewart, W. H. ..... 52

Timber Engineering Co., Inc. ..... 9
Truscon Laboratories ..... 59

U. S. Treasury Dept. ..... 36

Walker Cement Products Company ..... 41
Wallace & Tiernan Co., Inc. ..... Back Cover
Wood Co., R. D. ..... 53



THIS
STEEL SHEETING
*SAVES*
TIME AND METAL

Metal sheeting is a military *must* on many important war projects. Yet you want to be sure you are making the best possible use of it because steel is precious. So consider the economics of ARMCO Steel Sheeting.

This sturdy, light-weight sheeting goes in fast and easily owing to its smooth surface and small displacement—and still it can readily be pulled and used over and over again. This saves time and conserves steel for the war effort.

You can save even more time and metal by ordering ARMCO Sheeting in the exact gage and type you need. Interlocking, flange and clip-types are supplied in 8, 10 and 12 gage, in 12 and 14-inch widths, and in standard lengths up to 18 feet. Lengthwise corrugations provide ample strength, also make the sheeting nestable, simplifying storage and shipping problems. When you order ARMCO Sheeting, you can call on ARMCO engineers for help in solving unusual and difficult applications. Write or wire for quotations. Armco Drainage Products Association, 1055 Curtis Street, Middletown, Ohio.

★ ★ ★ ★

ARMCO SHEETING

# PUBLIC WORKS

**Founded in 1896**

***Devoted to the interests of the engineers and technical officials of cities, counties and states***

**Vol. 73 No. 12**

**A. PRESCOTT FOLWELL, Editor**

**DECEMBER CONTENTS**

**HIGHWAYS AND AIRPORTS**

Constructing an Airport on Florida Sands. *By C. H. Moneypenny* ..... 11
Road Maintenance in Wartime England ..... 13
Wartime Construction of Concrete Pavements ..... 17
A County Bridge Modernization Program. *By J. W. Harty* ..... 24
How Our Airports Are Handling the Snow Problem ..... 34
Well Worded State Highway Specifications ..... 38

**SEWERAGE AND SANITATION**

Wartime Problems in Refuse Collection and Disposal ..... 16
Sewage Treatment Plant for a Home for Mental Defectives. *By B. V. Howe* ..... 22
Humus from Rubbish and Sludge ..... 28
A Dry Well Replaces a Wet One for Pumping Sewage. *By Richard W. Halteman* ..... 40
Responsibility for Flooding by Sewer ..... 40
Cutting Off Water for Non-Payment of Sewer Charges ..... 41
The Sewerage Digest ..... 46

**WATER SUPPLY AND PURIFICATION**

Installation of a New Gallery at Elkhart, Ind. *By Charles L. Link* ..... 14
No Negligence in This Unguarded Excavation ..... 20
Eliminating Dead Ends for Fire Protection. *By C. E. Harrison* ..... 21
Preference Rating Procedure Up to Date ..... 32
Construction Contractor Not Responsible for Treatment Equipment ..... 42
The Waterworks Digest ..... 43

**THE WAR EMERGENCY** ..... 7

**GENERAL**

Keeping Up With New Equipment ..... 49
Reader's Service Department ..... 55
Letters to the Editor ..... 58

**Published monthly by PUBLIC WORKS JOURNAL CORPORATION**

Editorial and advertising offices: 310 East 45th St., New York, N. Y.

J. T. MORRIS, *President;* CROXTON MORRIS, *Treasurer;* ARTHUR K. AKERS, *Advertising Manager. Advertising representatives,* DAVID R. WATSON, *Western Manager,* Room 725, 506 So. Wabash Ave., Chicago, Ill.; ALONZO HAWLEY, 326 Bulkley Bldg., Cleveland, Ohio. SUBSCRIPTION RATES: U.S.A. and Possessions, Mexico and Cuba, $3.00; Canada, $3.50. All other countries, $4.00. Single Copies, 35 cents each except issues containing book-length texts, which are $1.00 apiece.

Official Navy Photo

# "Jap Slappers"

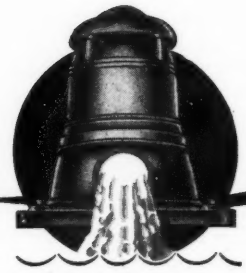
## NAVY MEN CALL THEM "P. T. BOATS"

Small, light and with an amazing amount of speed, the famed "P. T. Boats" can out-maneuver any destroyer, cruiser or battleship the enemy has ever built. They carry a death sting in their fore and aft torpedo tubes. And for their splendid accomplishments as fighting crafts, they are the pride and joy of the Allied navy men the world over. Their worth has been admirably proven on the field of action.

Layne Pumps and Well Water Systems bear an amazing similarity to the P. T. Boats, on the points of sturdiness. First in genuine quality and second, in that they, too, have proven their worth on the field of action. These Water Systems have been designed and are being built to fulfill a tremendously important task—that of providing millions and millions of gallons of water under any and all conditions. Throughout the Nation, the name Layne is as famed in the water producing field as is the name of P. T. Boats in Naval warfare.

Hundreds and hundreds of Layne Well Water Systems are now serving army camps, naval stations, ship yards, flying fields and munition plants. Operation, in many cases is twenty-hours of every day, month in and month out. Thanks to good designing and sturdy construction, not one has failed. Such a record is worthy of outstanding recognition. For late catalogs, bulletins, etc., address

LAYNE & BOWLER, INC.
Memphis, Tenn.



### *Nation-Wide Service*

LAYNE-ARKANSAS CO. . STUTTGART, ARK.
LAYNE-ATLANTIC CO. . . . NORFOLK, VA.
SAVANNAH, GA. . . . . ORLANDO, FLA.
LAYNE-BOWLER NEW ENGLAND CORP.
BOSTON . . . . . MASSACHUSETTS
LAYNE-CENTRAL CO. . . MEMPHIS, TENN.
LAYNE-NORTHERN CO. . MISHAWAKA, IND.
LAYNE-LOUISIANA CO. LAKE CHARLES, LA.
LOUISIANA WELL COMPANY . MONROE, LA.
LAYNE-NEW YORK CO. . NEW YORK CITY.
AND PITTSBURGH . . . . . PA.
LAYNE-NORTHWEST CO. MILWAUKEE, WIS.
LAYNE-OHIO CO. . . . . COLUMBUS, OHIO
LAYNE-TEXAS CO. . . . . HOUSTON AND
DALLAS . . . . . TEXAS
LAYNE-WESTERN CO. . KANSAS CITY, MO.
CHICAGO, ILL. . . . . OMAHA, NEBRASKA
LAYNE-WESTERN CO. OF MINNESOTA
MINNEAPOLIS . . . . . MINN.
INTERNATIONAL WATER SUPPLY, LTD.,
LONDON . . . . . ONTARIO, CANADA

*The above companies are affiliates of Layne & Bowler, Inc., Memphis, Tenn.*

**LAYNE PUMPS & WELL WATER SYSTEMS**

**WORLD'S LARGEST WATER DEVELOPERS**

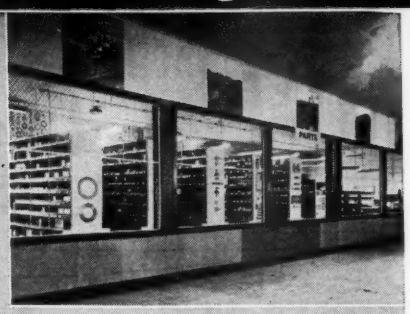
REPAIRS and maintenance of municipal and private industrial Water System should not be neglected. The Layne Organization is endeavoring to service existing installations with necessary repairs and parts. If your wells and pumps need attention, you are urged to write, giving full details of your requirements. No obligation.

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

# ere's What We Mean by JAEGER SERVICE

## 1: COMPLETE STOCKS OF REPAIR PARTS

as near to you as your telephone.

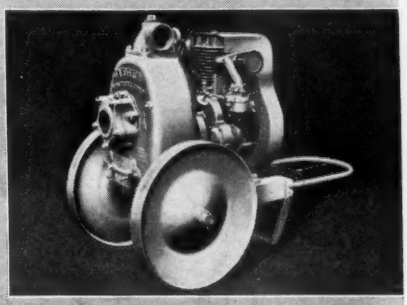


## 2: TRAINED MECHANICS,

with factory shop facilities, to check, repair and maintain your construction and paving equipment in efficient working order.

## 3: STOCKS OF JAEGER "Sure-Prime" PUMPS and MIXERS

for sale or rent, to meet the heavy winter need.



## 4: DIRECT HELP ON YOUR PAVING PROBLEMS

— for airports and strategic roads (concrete or bituminous) we offer experienced engineering counsel, knowledge of local conditions and latest type spreading and finishing equipment.

## *As Near to You as Your Telephone*

### ALABAMA
RMINGHAM, Gantt Machinery Co., Inc., Ed.
OBILE, Turner Supply Company
ONTGOMERY, Ray-Brooks Machinery Co.

### ARIZONA
HOENIX, Smith-Booth-Usher Company

### ARKANSAS
TTLE ROCK, Choctaw Culvert & Mach. Co.

### CALIFORNIA
OS ANGELES, Smith-Booth-Usher Company
AN FRANCISCO, Bacon Company, Edward R.

### COLORADO
ENVER, Moore Equipment Company, H. W.

### CONNECTICUT
AST HARTFORD, Hedge & Mattheis Company
EST HAVEN, Hedge & Mattheis Company

### FLORIDA
ACKSONVILLE, Moody, M. D.
IAMI, Llewellyn Machinery Corp.
AMPA, Cameron & Barkley Co.

### GEORGIA
TLANTA, Armstrong & Bro. Company, R. S.

### ILLINOIS
HICAGO, Arrow Contractors Equipment Co.

### INDIANA
ORT WAYNE, Pioneer Coal Company
AMMOND, Standard Equip. & Supply Corp.
NDIANAPOLIS, Deaney, A. F.
OUTH BEND, General Equipment Company

### IOWA
AVENPORT, Arrow Equipment Company
ATERLOO, Waterloo Construction Company

### KENTUCKY
LOUISVILLE, Whayne Supply Company, Roy C.

### LOUISIANA
NEW ORLEANS, Fletcher Equipment & Supplies
NEW ORLEANS, Southern States Equipment Co.

### MAINE
BANGOR, Hedge & Mattheis Company
PORTLAND, Hedge & Mattheis Company

### MARYLAND
BALTIMORE, John C. Louis Co., Inc.
BETHESDA, John C. Louis Co., Inc.

### MASSACHUSETTS
BOSTON, Hedge & Mattheis Co.
WEST SPRINGFIELD, Hedge & Mattheis Co.
WORCESTER, Hedge & Mattheis Co.

### MICHIGAN
DETROIT, Burke, Cyril J.
DETROIT, Schuster Equipment Co.
GRAND RAPIDS, Keller Tractor & Equip. Co.

### MINNESOTA
DULUTH, Standard Salt & Cement Co.
MINNEAPOLIS, Minneapolis Equipment Co.

### MISSISSIPPI
JACKSON, Choctaw Culvert & Mach. Co.

### MISSOURI
KANSAS CITY, Bublitz Machinery Company
ST. LOUIS, Allied Construction Equip. Co.

### MONTANA
HELENA, Montana Powder & Equipment Co.

### NEBRASKA
OMAHA, American Machinery & Supply Co.

### NEW HAMPSHIRE
CONCORD, Hedge & Mattheis Company

### NEW JERSEY
NEWARK, The Jaeger-Lembo Machine Corp.
RED BANK, Prather, Grafflin S.

### NEW MEXICO
ALBUQUERQUE, Harrison Co., R. L.

### NEW YORK
ALBANY (MENANDS), Kelley Co., Inc. E. B.
BUFFALO, Rupp Equip. Co.
CORONA, L. I., Jaeger-Lembo Machine Corp.
PLATTSBURG, Jerry, Vincent S.
ROCKVILLE CENTRE, L. I., Jaeger-Lembo Machine Corp.
ROCHESTER, Syracuse Supply Co.
SYRACUSE, Syracuse Supply Co.

### NORTH CAROLINA
RALEIGH, North Carolina Equipment Co.
STATESVILLE, North Carolina Equipment Co.

### OHIO
AKRON, Hardware & Supply Company
CANTON, Figley Company, The W. K.
CINCINNATI, Highway Equipment Company
CLEVELAND, Pattison Supply Co., The W. M.
DAYTON, Flack Equipment Company
GALLIPOLIS, Bischoff, R. E.
HAMILTON, Miami Equip. & Supply Co.
TOLEDO, Flack Equipment Company
YOUNGSTOWN, Stambaugh-Thompson Co.

### OKLAHOMA
OKLAHOMA CITY, Wylie-Stewart Mach. Co.

### OREGON
PORTLAND, Nelson Equipment Company

### PENNSYLVANIA
ERIE, John F. Steiner
HARRISBURG, Standard Equipment Company
PHILADELPHIA, Service Supply Corporation
PITTSBURGH, Highway Equipment Co.
WILKES-BARRE, Standard Equipment Co.

### RHODE ISLAND
PROVIDENCE, Hedge & Mattheis Company

### SOUTH CAROLINA
COLUMBIA, Bell-Lott Road Machinery Co.

### TENNESSEE
CHATTANOOGA, Osborne Equipment Company
KNOXVILLE, Osborne Equipment Company
MEMPHIS, Choctaw Culvert & Mach. Co.
NASHVILLE, McCarthy, Jones & Woodard Co., Inc.

### TEXAS
DALLAS, Browning-Ferris Machinery Co.
EL PASO, Tri-State Equipment Company
HOUSTON, Browning-Ferris Machinery Co.

### UTAH
SALT LAKE CITY, Jones Equip. Co. The C. H.

### VERMONT
BELLOWS FALLS, Hedge & Mattheis Company
BURLINGTON, Strong Hardware Company

### VIRGINIA
LYNCHBURG, Branch, Marion S.
NORFOLK, Hampton Roads Tractor & Equip. Co.
RICHMOND, Smith-Courtney Company

### WASHINGTON
SEATTLE, A. H. Cox & Company
SPOKANE, Nelson Equipment Company

### WEST VIRGINIA
CHARLESTON, Capital City Supply Company
CLARKSBURG, General Equipment Co., Inc.
HUNTINGTON, Banks-Miller Supply Company
WHEELING, Seabright Co., H. L.

### WISCONSIN
MILWAUKEE, Boehck Equipment Company

### WYOMING
CHEYENNE, Wilson Equipment & Supply Co.

**JAEGER DISTRIBUTORS IN OVER 100 CITIES ARE "GEARED UP" FOR WAR SERVICE**

# CALCIUM CHLORIDE MAKES ABRASIVES *DIG DEEP—HOLD TIGHT—GIVE TRACTION!*

UNTREATED grits brush off easily and have to be replaced. So, if you want most effective skidproofing results when you spread abrasives, see that they are treated with calcium chloride. You save money, too, since treatment makes abrasives go three times as far. Tests show that proper treatment saves enough grits to reduce the cost of each application by $6.60 per mile of 18 foot road at the conservative abrasive cost of $1.50 per ton applied.

Truck loads are heavier this year and cargos vital to the war effort. A truck load of vital parts lost can tie up a whole production line. Road men must see to it that such losses do not occur through hit-or-miss ice control methods. They will cut costs, save gas and tires, reduce labor and provide better skidproofing with calcium chloride treated grits. Methods are fully explained in Bulletin No. 27—available on request. Write for your copy today.

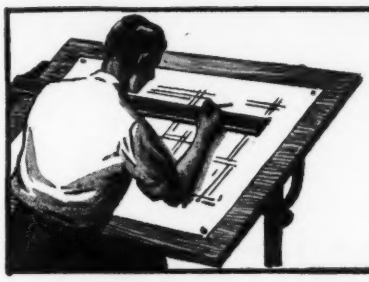
**CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Bldg., Detroit, Mich.**

**CALCIUM CHLORIDE**

*FAST • POSITIVE • ECONOMICAL*

MAKES ICY ROADS SAFER
●
SAVES UP TO $6.00 A MILE EACH TREATMENT

VOL. 73 PUBLIC WORKS No. 12
Entered as second-class matter at the Post Office at New York, N. Y., Sept. 1, 1922, under the act of March 3, 1879.
Published monthly by PUBLIC WORKS JOURNAL CORPORATION, 310 East 45th St., New York, N. Y.
Subscription Rates: U. S. A. and Possessions, Mexico and Cuba, $3.00; Canada, $3.50. All other countries, $4.00.
DECEMBER, 1942



# "ONE OF THE MOST USEFUL PIECES OF WORK THAT I HAVE RECEIVED IN 20 YEARS"..

*WRITES ONE ARCHITECT*

**FREE**
**TO ARCHITECTS AND ENGINEERS**

*The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood.*

*AND HERE'S WHAT SOME OTHERS SAY:*

"An excellent reference book at a most appropriate time. Thank you!"

"Many thanks. Best thing I've seen. Much appreciated."

"These designs are a great time saver to the architect."

"A very commendable job in bringing data to the architect, of high practical value."

In TYPICAL DESIGNS OF TIMBER STRUCTURES we have grouped the plans of 45 representative types of timber structure that have been *engineered* by the TECO System of Construction. A request on your professional letterhead will bring you a copy of this valuable reference book.

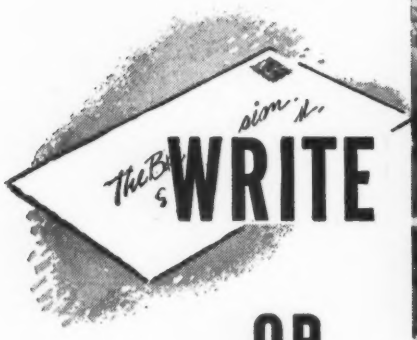
**Timber ENGINEERING COMPANY**

WASHINGTON, D. C. PORTLAND, OREGON

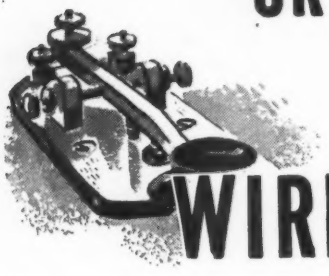
*When writing, we will appreciate your mentioning* **PUBLIC WORKS**

# 3 WAYS TO SOLVE YOUR ROAD MAINTENANCE PROBLEMS NOW!

PHONE,




OR



WIRE for the TARVIA Field Man

● With new highway construction limited for the duration to military requirements, the proper maintenance of existing roads is more important than ever. Strategic cross-country highways and vital feeder roads must be kept in first class condition to assure mobility for soldiers and industrial workers; for munitions, food and essential supplies.

The responsibility rests with every highway engineer and contractor. Are the roads in your district ready?

There's a grade of Tarvia* just right for every rebuilding, resurfacing or patching requirement. For nearly 40 years this versatile paving material has been helping highway engineers save heavy annual replacement costs and get the most miles out of available highway funds.

Why not discuss your problems with the Tarvia field man? He's ready with helpful, sound advice and cooperation on any highway maintenance problem. All you have to do is phone, wire or write our nearest office. . . .

Barrett Tarvia*

**THE BARRETT DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

*One of America's Great Basic Businesses*

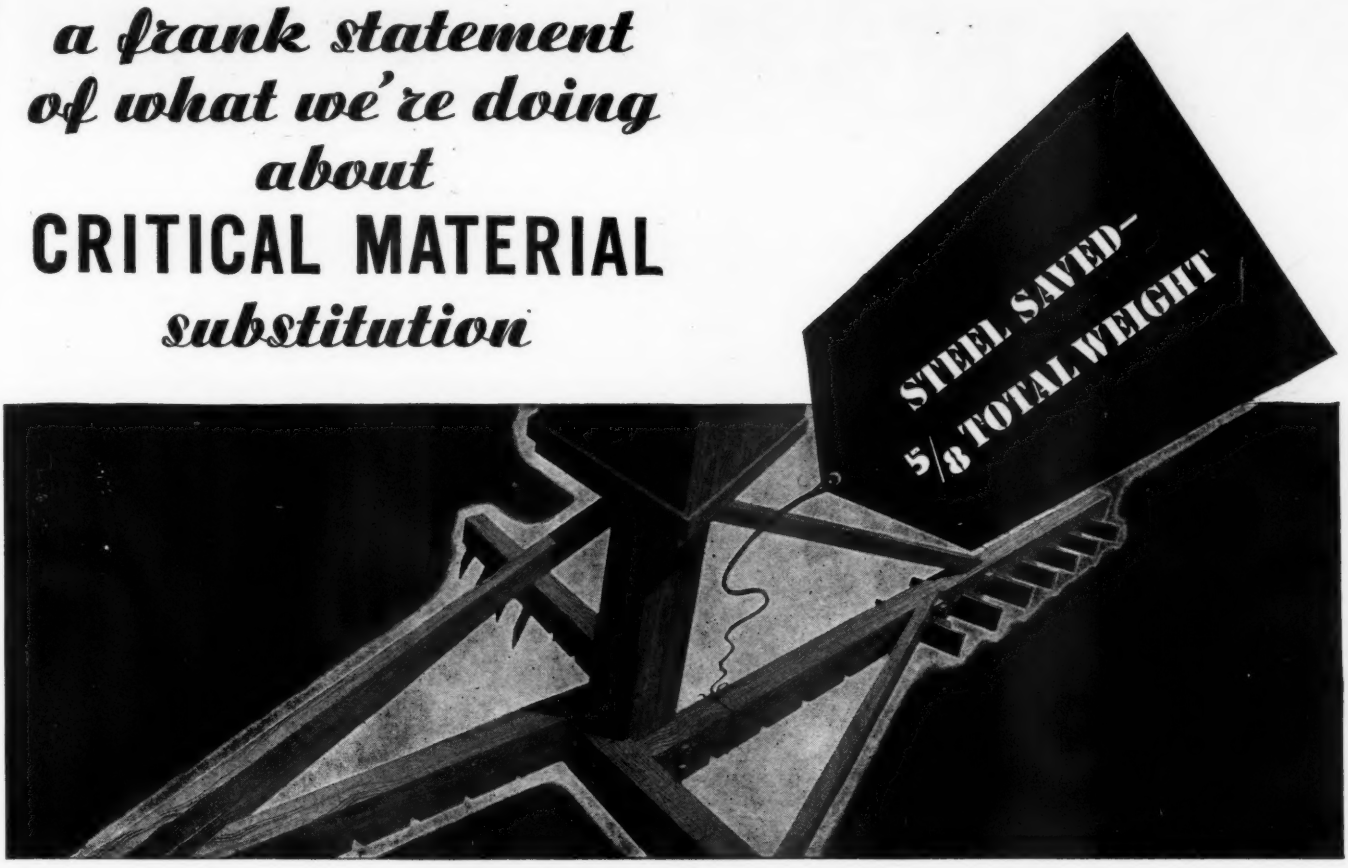
**SEND FOR THE NEW BARRETT TARVIA MANUAL →**

Chicago . . . Birmingham . . . St. Louis . . . Detroit . . . Philadelphia . . . Boston . . . Providence . . . Rochester . . . Lebanon, Pa. . . . Minneapolis . . . Cleveland . . . Hartford . . . Columbus . . . Youngstown . . . Toledo . . . Syracuse . . . Norwood, N. Y. . . . Cincinnati . . . Buffalo . . . Bethlehem . . . Portland, Me.

*Reg. U.S. Pat. Off.


*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 55-57*

# *a frank statement of what we're doing about* CRITICAL MATERIAL *substitution*




*Through critical material substitution, a recent design study showed a saving of 5000 lbs. of critical steel out of an 8000 lb. total weight on one machine alone! Important—yes—but more important still is the fact that it was not an isolated case. For we are making every effort to use the minimum of critical materials in all our equipment.*

★ ★ ★ ★ ★

For instance, we are redesigning, using wood structural members for walkways, handrails, cross braces and paddles wherever possible.

We are running tests on special wood products to be used where this ordinary timber won't stand the gaff due to lack of tensile strength or resistance to wear and water. Many of these tests are proving to be successful, which will enable us to carry the use of wood as a substitute still further.

The all-essential aluminum and brass in skimmers have been eliminated. The use of mercury in Distributor mechanisms has been cut to a minimum and where possible, dispensed with entirely.

Finally, we are now indicating on all our drawings where the client himself can use less critical material without endangering operation. In some cases this means concrete instead of steel in piers—in others, wood instead of reinforced concrete in tanks.

★ ★ ★ ★ ★

*We can't build a plastic Clarifier—or Distributor—or Digestor. Critical material substitution is, for us, a slow and painful process. It won't enable us to supply you for less money—and in most cases you'll have to wait a bit longer for delivery due to design changes. But it will enable us to make more equipment available—with less critical material consumption. And in most cases these substitutes can be replaced with the original materials when "criticals" are again available.*

DORR

RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

DORRCO

**THE DORR COMPANY, INC., ENGINEERS**

NEW YORK, N. Y. . . . 570 LEXINGTON AVE.
ATLANTA, GA. . . . CANDLER BUILDING
TORONTO, ONT. . . . 80 RICHMOND ST.W.
CHICAGO, ILL. . . . . 221 NO. LA SALLE ST.
DENVER, COLO. . . . . COOPER BUILDING
LOS ANGELES, CAL. . . . 811 WEST 7TH ST.

RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

**SUGAR PROCESSING**
PETREE & DORR ENGINEERS, INC.
570 LEXINGTON AVE., NEW YORK

*When writing, we will appreciate your mentioning* PUBLIC WORKS

# A Nation-Wide

**Thousands of communities throughout the nation have installed Johns-Manville Transite Pipe for water lines. Today the entire production is being used for the war program, where, under similar service conditions it is providing the same efficient, low-cost water transportation it has contributed to our civilian needs.**

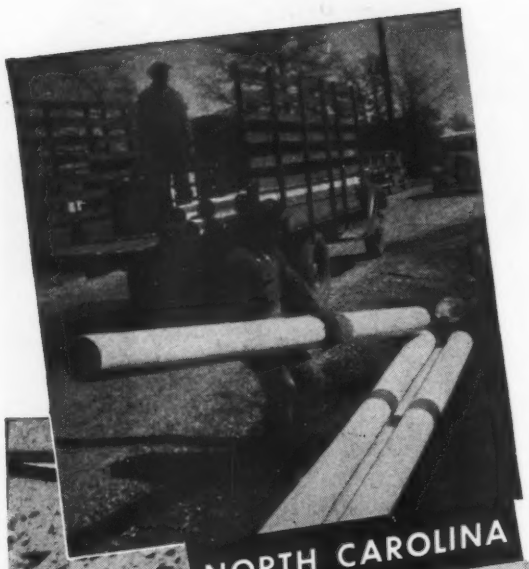
**Easy to handle**—Light in weight, Transite Pipe comes in 13-foot lengths. All but the larger sizes can be handled without mechanical equipment.

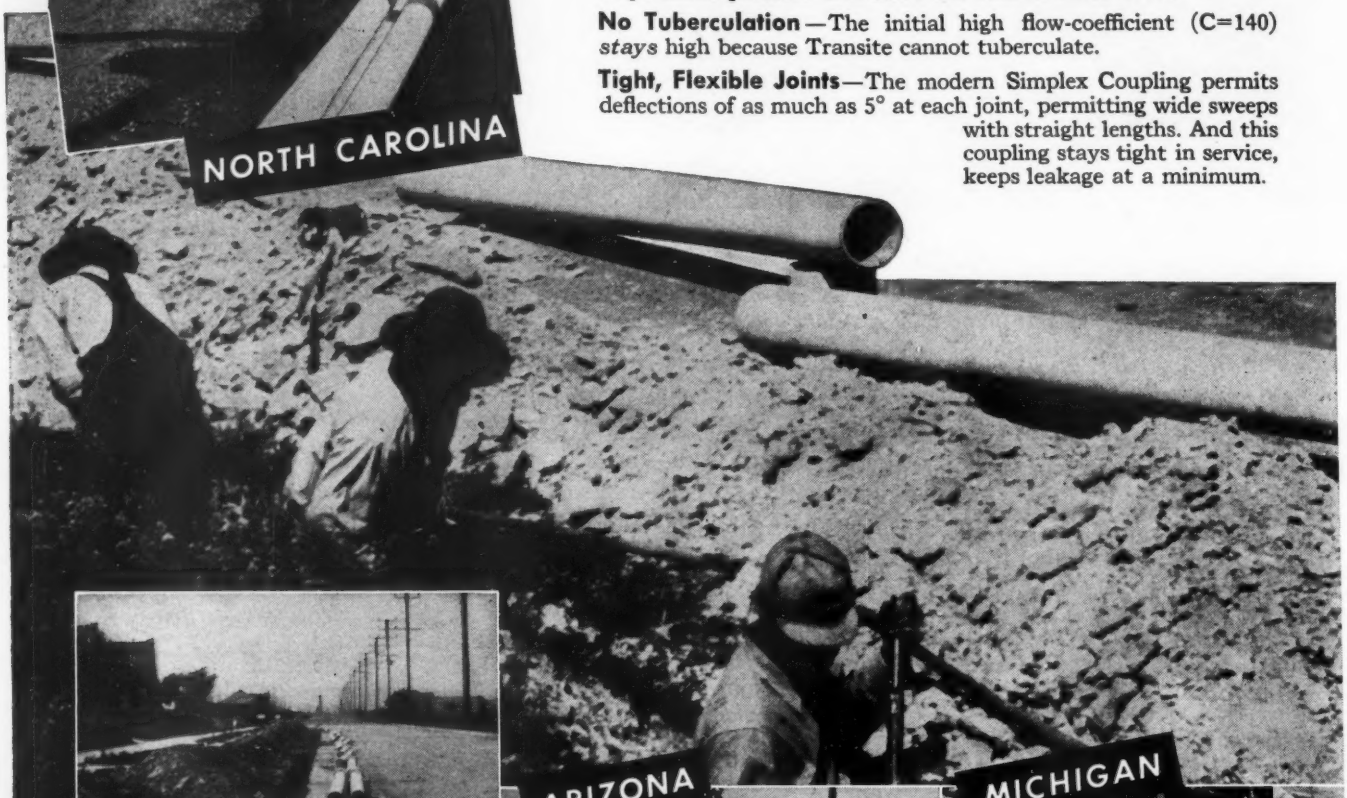
**Rapid Assembly**—Even unskilled crews can form tight joints quickly and easily with the Simplex Coupling. No heating or pouring required.

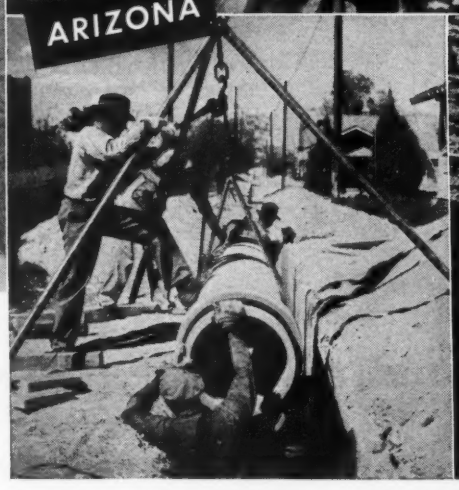
**Low Maintenance**—High corrosion-resistance, a feature of Transite's asbestos-cement composition, plus lasting tight joints, helps make possible Transite's low maintenance costs.

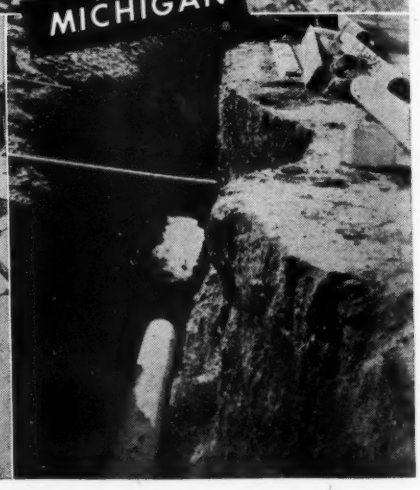
**No Tuberculation**—The initial high flow-coefficient (C=140) *stays* high because Transite cannot tuberculate.

**Tight, Flexible Joints**—The modern Simplex Coupling permits deflections of as much as 5° at each joint, permitting wide sweeps with straight lengths. And this coupling stays tight in service, keeps leakage at a minimum.

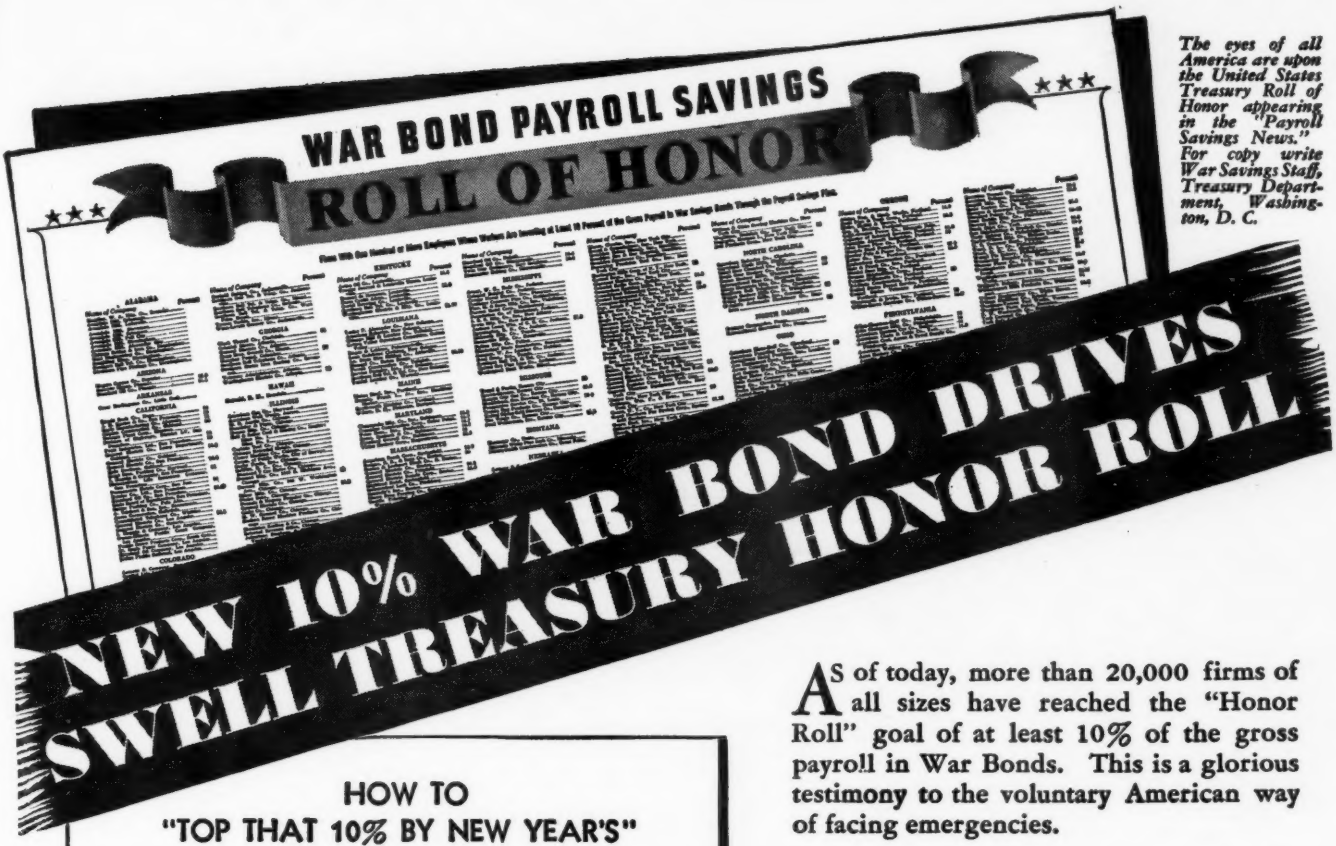





*When you need special information—consult the classified* **READER'S SERVICE DEPT.**, *pages 55-57*




*The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For copy write War Savings Staff, Treasury Department, Washington, D. C.*

## HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences sponsored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. ***Decide to get 10%.***
   It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. ***Get a committee of labor and management to work out details for solicitation.***
   a. They, in turn, will appoint captain-leaders or chairmen who will be responsible for actual solicitation of no more than 10 workers.
   b. A card should be prepared for each and every worker with his name on it.
   c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. ***Set aside a date to start the drive.***
4. ***There should be little or no time between the announcement of the drive and the drive itself.***
   The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

As of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from $50,000 to $100,000.)

*TIME IS SHORT.* Our country is counting on you to—

## "TOP THAT 10% BY NEW YEAR'S"

EVERYBODY EVERY PAYDAY AT LEAST 10%

*Save with*

# War Savings Bonds

**This space is a Contribution to America's All-Out War Effort by PUBLIC WORKS**

GALION
No. 101
MOTOR GRADER

# JUST AS BUSY ON THE HOME FRONT

Vital construction jobs... military highways, access roads to war plants . . . runways, aprons and taxiways for airports . . . streets for housing projects . . . all war paths in a sense. All must be completed NOW. Machinery of all kinds is doing meritorious work . . . taking the brunt of the fighting on the home front behind the scenes. Galion rollers, graders and spreaders are busy . . . they continue to go all out in a war that was put up to industry at the very start.

GALION TANDEM ROLLER

## The Galion Iron Works & Mfg. Co.

*Main Office and Works:* GALION, OHIO

# GALION

# Now—Sure Winter Concrete-Curing

## OVER 96% EARLY WATER RETENTION *with*—

# TRUSCON TRU-CURE

*The Time and Money-Saving Method of Curing Concrete*

SPRAY IT ON
NO PAPER
NO COTTON MATS

Normal protective measures against cold have never been considered a substitute for curing concrete as cold weather does not alter the need for proper curing.

Moisture evaporation means heat loss. In cold weather the normal chemical reaction of hydration is slowed down. This emphasizes the importance of making sure that water is retained until the curing job is completed.

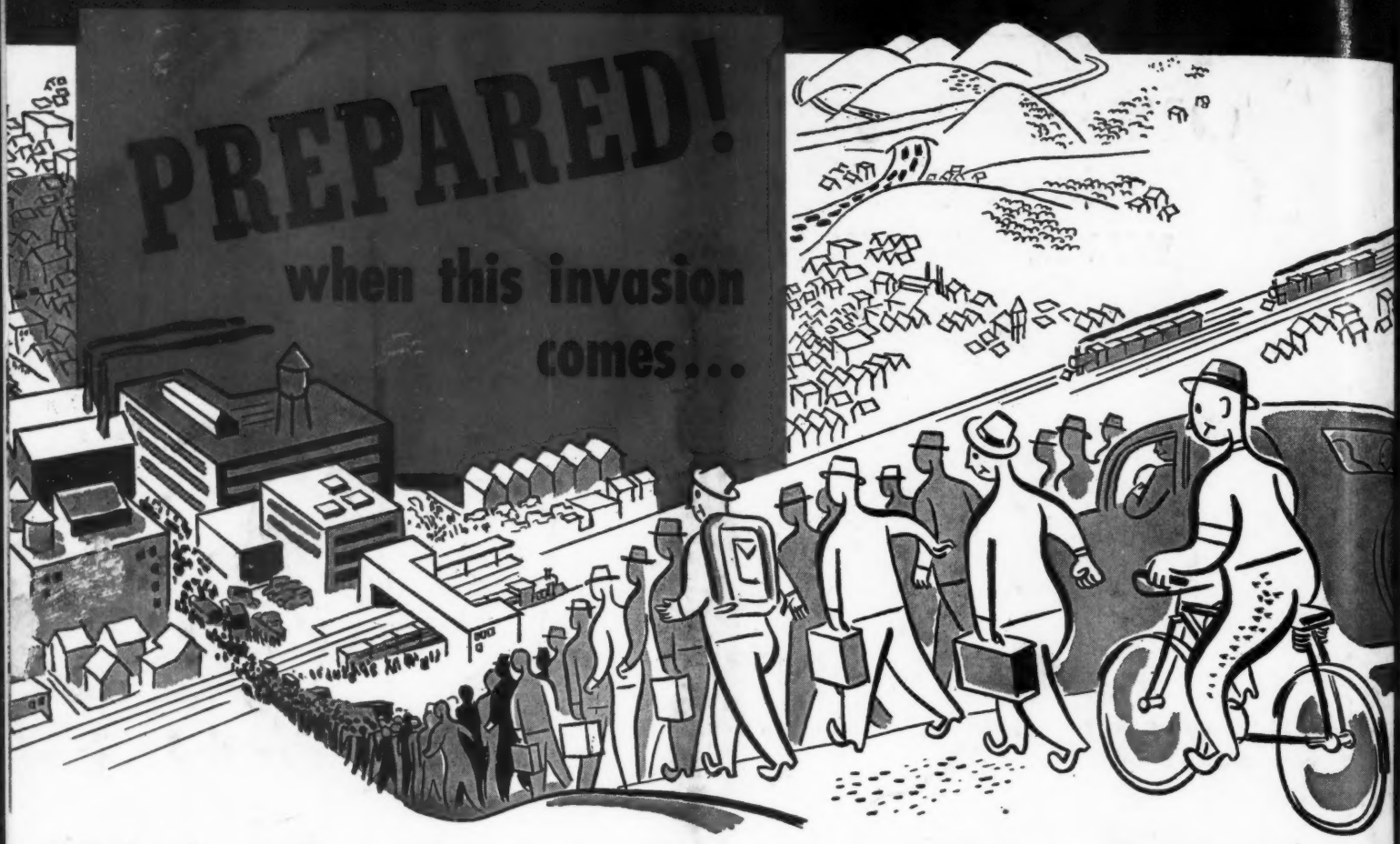
By sealing in the water Truscon Tru-Cure permits of normal, necessary curing—prevents the protective layer of dry straw from "sucking" moisture out of the concrete—provides heat retention through water retention.

"Tru-Cure-and-straw" has demonstrated superiority over ordinary methods of winter-curing. Other methods usually require a waiting period—take longer, thus giving more chance for evaporation—necessitate re-handling of materials and do not seal in the moisture effectively.

Truscon Tru-Cure does away completely with multiple operations. It is applied immediately after finishing and provides a thoroughly continuous sealing film without any "thin spots" upon which the protective straw can be laid. It saves time, labor and handling—and, winter or summer, assures a uniformly cured concrete.

WRITE FOR LITERATURE ON THIS ALL-YEAR-ROUND METHOD OF CURING CONCRETE APPROVED BY U. S. ENGINEERS.

**TRUSCON LABORATORIES** DETROIT MICHIGAN




## With the influx of new workers into war-plant communities...

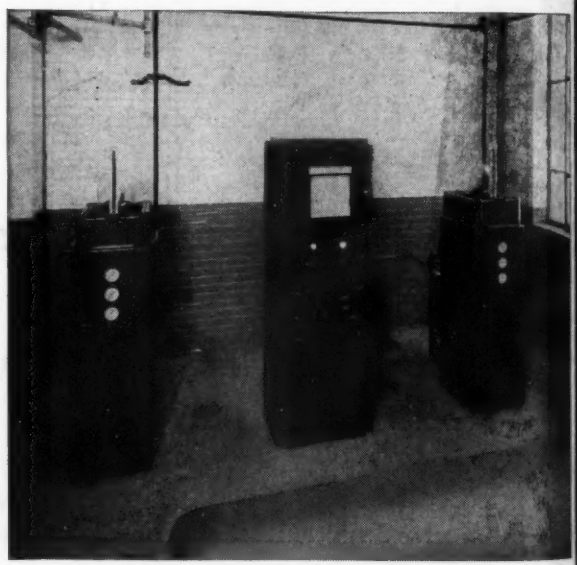
# CHLORINATION AGAIN PROVES ITS VALUE AS A SEWAGE PLANT *SAFETY RESERVE*

The sudden, unexpected population growth now taking place in many communities is putting an extra burden on sewage treatment facilities right at a time when expansion is impossible or subject to serious delay.

Yet many of these communities have found it possible to "carry on" without lowering their sanitary standards, and without creating objectionable conditions around the plants.

The answer is the SAFETY RESERVE they have in modern W&T Chlorinators. Though this equipment may have been used only in an auxiliary way under *normal* conditions, it was ready and waiting to raise the efficiency and effective capacity of the plant in the face of the abnormal load.

Peak loads . . . drought conditions . . . hot spells . . . breakdowns in equipment which cannot be immediately replaced . . . these and other emergencies are being more easily overcome where W&T Chlorinators are an integral part of the plant installation. SA-138



W&T Chlorinators meet the needs of all types of sewage treatment plants. Application may be controlled manually, automatically (proportional to flow) or on a programmed "step-by-step" basis. And with W&T *potential chlorination*, changes in both strength and flow of sewage are instantly met with proper changes in the application rate.

*"The Only Safe Sewage is a Sterilized Sewage"*